

Stormwater Narrative

Hinesburg Center – Phase II

Revised May 2022

1. Project Description

The project parcel is located to the west of VT Route 116 and just south of Patrick Brook in the Town of Hinesburg. The parcel is accessible via Farmall Drive along both the east and south property lines. To the east of the parcel is Phase I of Hinesburg Center, which is a mixed-use development. The Creekside development is located to the south of the project parcel and consists of 28 single-family lots and 4 multi-family units. Patrick Brook is located along the northerly project boundary and LaPlatte River is located along the westerly and southwesterly boundary.

This project proposes the construction of 15 new single-family lots, three multi-family units, a 34-unit mixed-use building and three other lots commercial in nature. In addition, four (4) new road segments are proposed along with pedestrian friendly streetscapes and associated utility infrastructure. Stormwater runoff associated with the new impervious surfaces will be conveyed via storm system and treated via a series of varying practices that meet the 2017 Vermont Stormwater Management Manual (VSMM), including a gravel wetland, bioretention basin, proprietary filter treatment device, and disconnection. Due to site topography and the linking of this project to multiple existing roads, some of the new impervious will be treated, detained, and then discharged to existing stormwater systems. We are proposing alterations to the drainage patterns and treatment of impervious associated with the existing Hinesburg Center Phase I development) discharge permit 6506-9015). There are two treatment areas located within the project limits that will be eliminated, a Disconnection Area and a Grass Channel. The Disconnection Area will be directed to the Hinesburg Center Phase I Wet Pond and the Grass Channel will be directed to a new Filterra Bioretention Vault for treatment, then to an underground pipe storage system for detention, and controlled release to the Creekside storm system, making its way to the existing Dry Pond.

The project has been designed to meet Low Impact Development guidelines as required by the Town and to be permissible under a State Stormwater Discharge Permit, which will be required prior to construction.

2. Existing Condition

The Hinesburg Center Phase II project area is an existing agricultural field that has been hayed for decades. There are two existing raised walking trails on the site, one running parallel to Patrick Brook and the other running north-south near the center of the property, which connects Farmall Drive to the trail along Patrick Brook. Generally, the project site slopes to the west and south. The site is extremely flat with slopes between 0-2% with the exception of the raised access trail, areas adjacent to existing streets, and the Patrick Brook & LaPlatte River stream banks.

The majority of the site is comprised of Winooski very fine sandy loam (HSG C), with some areas along the eastern project bounds mapped as Limerick silt loam (HSG C). Lamoureux and Dickinson conducted a number of soil augers and infiltration tests across the site. The soil investigations within the field generally yielded very silty soils with mottling at depths of less than 12". In accordance with

NEH guidance, any soils with a water table within 24" of the surface should be classified as HSG D soils. Based on the above we have reclassified the soils within the field to be HSG D.

Soils adjacent to Patrick Brook were identified as fine sands with mottling at depths of approximately 24". Infiltration tests were conducted in a number of locations that yielded moderate infiltration rates ranging from 10-20 in/hr. Although these rates would allow for the construction of infiltration practices, their depth to SHGW and their proximity to the Brook limit their viability. Infiltration practices would generally need to be located within the River Corridor and the Town of Hinesburg 100' Stream Buffer/Setback from top of bank in order to make use of the infiltrative soils.

3. Existing Stormwater System:

The site currently has an existing grass channel that is providing water quality treatment for a portion of Farmall Drive, Kaileys Way, and the existing sidewalk on the east side of Kaileys Way. With the construction of Road A, the grass channel will be removed and this stormwater will be treated via a new alternatives treatment practice approved by the State and meeting the 2017 VSMM (see section on Proposed Stormwater System below for detailed information).

There is also an area adjacent to Kaileys Way that was designed to provide disconnection and treatment of runoff for a portion of Kaileys Way. The disconnect area will be eliminated with the construction of Building C and due to existing drainage patterns and upgrades to the existing HCl Wet Pond will be made to provide treatment.

4. Proposed Stormwater System:

Stormwater runoff will be treated via a new gravel wetland, a new bioretention basin, a new alternatives treatment practice (Filterra Bioretention System), and rooftop disconnection where feasible. Runoff from the majority of the site (6.85 acres) is managed within the gravel wetland, which provides a high level of both TSS removal (80-97%) and TP removal (60-80%). Runoff from a portion of onsite and offsite drainage area (0.46 acres) is managed within the two Filterra Bioretention Systems, which is manufactured to provide 86% TSS removal and 70% TP removal, in addition to multiple high levels of heavy metal and hydrocarbon removal. The disconnection area (which totals 0.22 acres of new impervious area) is a Tier 1 practices and generally achieve 98% TSS removal and 80% TP removal.

All impervious surface is treated and managed onsite. The Filterra units will provide WQ_v treatment onsite, however, this practice does not provide detention or controlled release, therefore we are using this in conjunction with an underground pipe storage system to satisfy requirements for the CP_v and Q_{P10} .

a) Description of Impervious Area:

- i) Existing impervious area = 0.00 acres
- ii) New impervious area treated onsite = 4.93 acres
 - (1) 4.50 acres treated in proposed gravel wetland
 - (2) 0.16 acres treated via Filterra Bioretention System and Underground Pipe Storage System
 - (3) 0.22 acres treated via simple disconnect
- iii) Existing impervious area (from offsite) treated onsite

- (1) 0.17 acres from HCl grass channel treated onsite via Filterra Bioretention System and Underground Pipe Storage System
 - (2) 0.10 acres from HCl simple disconnection treated onsite via gravel wetland
- b) Receiving Body:
- i) S/N002: LaPlatte River
 - ii) S/N003: Stormwater system to The Canal
 - iii) S/N004: Stormwater system to The Canal
- c) Fish Habitat Designation for Receiving Water:
- i) S/N001: Cold water fishery
 - ii) S/N002: Cold water fishery
 - iii) S/N003: Cold water fishery
- d) Description of compliance with each of the treatment standards in the 2017 VSMM including the treatment practices or waivers used to meet each of the following standards:
- i) Groundwater Recharge Standard:
 - (1) Sitewide: The Groundwater Recharge Standard required for this project is provided via simple disconnection. The new project area is not required to meet Groundwater Recharge Standard as the site has been assessed to be HSG D soils based on NEH guidance, however the drainage areas from Hinesburg Center Phase I were evaluated in previous application to be HSG B and C soils, therefore we are satisfying the Groundwater Recharge Standards for these locations.
 - ii) Water Quality Treatment Standard (WQ_v):
 - (1) S/N001: The Water Quality Treatment Standard is met by providing 50% volume within the gravel wetland stone permanent pool and its forebay, along with 24-hour extended detention. The Water Quality Treatment Standard is also met by providing simple disconnection of rooftops.
 - (2) S/N002: The Water Quality Treatment Standard is met via two Filterra Bioretention Systems, which is an approved alternatives treatment practice by the State of Vermont.
 - (3) S/N003: The Water Quality Treatment Standard is met via a bioretention basin (not designed to infiltrate) by filtering the entire WQ_v through the bioretention media.
 - iii) Channel Protection Standard (CP_v):
 - (1) S/N001: The Channel Protection Standard is waived as this site drains directly to the LaPlatte River, which is a water with a drainage area greater than 10 square miles, of which the site makes up less than 5% of the watersheds area.
 - (2) S/N002: The Channel Protection Standard is provided via an Underground Pipe Storage System utilizing a minimum orifice size of 1" to maximize extended detention.
 - (3) S/N003: The Channel Protection Standard is met via a bioretention basin (not designed to infiltrate) by filtering the entire CP_v through the bioretention media.

- iv) Overbank Flood Protection Standard (Q_{P10}):
 - (1) S/N001: The Overbank Flood Protection Standard is waived as this site drains directly to the LaPlatte River, which is a water with a drainage area greater than 10 square miles, of which the site makes up less than 5% of the watersheds area.
 - (2) S/N002: The Overbank Flood Protection Standard is provided via an Underground Pipe Storage System utilizing a minimum orifice size of 1" to maximize extended detention.
 - (3) S/N003: The Overbank Flood Protection Standard is provided via detention and controlled release of the 10-year storm event within the surface ponding of the bioretention basin.

- v) Extreme Flood Protection Standard (Q_{P100}):
 - (1) S/N001: The Extreme Flood Protection Standard is waived as there is less than 10-acres of total impervious surface associated with this site.
 - (2) S/N002: The Extreme Flood Protection Standard is waived as this site drains directly to the LaPlatte River, which is a water with a drainage area greater than 10 square miles, of which the site makes up less than 5% of the watersheds area. In addition, there is less than 10-acres of total impervious surface associated with this site.
 - (3) S/N003: The Extreme Flood Protection Standard is waived as there is less than 10-acres of total impervious surface associated with this site.

- e) Analysis of existing and proposed stormwater systems:
 - i) Hinesburg Center Phase II 100-year storm event
 - (1) The proposed Hinesburg Center Phase II stormwater system was subdivided and modelled at each catch basin to determine if the system could convey the 100-year storm event. The model is attached as an appendix to this Narrative. In sum, the system was sized to generally convey the 100-year storm event without ponding except for minor ponding at catch basin #3 located on Road D. The ponding level at this catch basin was found to be 3" above the grate, which is significantly below (1' or more) the likely first floor elevations of any single-family residence located along Road D.

 - ii) Creekside Development analysis at multiple storm events
 - (1) There are two points of analysis that introduce stormwater into the existing Creekside Development; discharge point S/N002 (Filterra/pipe storage outlet) and S/N003 (bioretention basin and Lot 30 drainage network outlet).
 - (a) S/N002 – This discharge point was modelled to detain and provided controlled release for up to the 10-year storm event.
 - (i) During rain events up to the 10-year-storm event the discharge rate into the Creekside system is 0.05 cfs or less.
 - (ii) The underground pipe storage system also provides some detention for the 25-year storm event.
 - (iii) During the 100-year storm event the underground pipe storage system does not provide detention and controlled release, however, it is important to note that

under the 100-year storm event the existing Creekside storm system is fully inundated and the discharge from HCII does not create this condition.

- (b) S/N003 – This discharge point was modeled to provide extended detention and controlled release up to the 10-year storm event for the bioretention basin which treats stormwater from the HCII project. In addition, to address concerns of Creekside residence, improvements to Lot 30 are proposed to balance the need to minimize standing water while also providing controlled release to stagger the peak discharge into the existing Creekside stormwater system.
 - (i) During rain events up to the 1-year storm event the discharge rate into the Creekside system is under 0.01 cfs from the bioretention basin and 0.05 cfs from the Lot 30 drainage improvements due to the implementation of a new controlled release structure at the western end of Lot 30.
 - (ii) During the 10-year storm event the discharge rate into the Creekside system is 0.02 cfs from the bioretention basin and 1.61 cfs from the Lot 30 improvements. Ponding during the 10-year storm event reaches an elevation of 328.79' which does not encroach onto the existing Creekside lots. Ponding on Lot 30 subsides within 12 hours of the end of the 10-year storm event.
 - (iii) During the 100-year storm event the discharge rate into the Creekside system is 0.38 cfs from the bioretention basin and 6.22 cfs from the Lot 30 improvements. Ponding during the 100-year storm event reach an elevation of 329.17' which does encroach onto the existing Creekside lots but is still well below the first floor elevation of any of the Creekside homes.

5. Low Impact Development Criteria:

Hinesburg requires the use of Low Impact Development (LID) techniques where feasible based upon site characteristics. The following is a summary of the LID practices evaluated and justification for incorporation or exclusion:

a) Cluster Development:

The Planned Unit Development is a form a Cluster Development that incorporates reduction in lot sizes and setbacks in order to concentrate development in limited areas while preserving open space. This technique typically leads to a reduction in infrastructure and impervious surfaces. This development is requesting the reduction of lot depth from 100' to 95', reduction of lot widths from 60' to 47', reduction in lot area from 6,000 sf to 4,865 sf, and the reduction in distances of road centerlines from the required 200'. Each of these requested reductions in zoning regulations helps to promote the Cluster Development by increasing development density within focalized areas and dedicating open space for preservation.

b) Minimize Pavement Widths:

Reduction in pavement widths or the elimination of on-street parking can help to reduce new impervious surfaces and in turn reduce stormwater runoff. The Town of Hinesburg Road Policy Standards state that the traveled way width in the Village districts is 22', which equates to 11' travel lanes. Where parking is provided, on-street parking stalls are to be 8' in

width. On-street parking allows for the efficient use of land and reduction of impervious surface, compared to off-street parking lots. We are proposing the following lane widths and descriptions of on-street parking:

- Road A – 11' wide travel lanes with 8' wide parking stalls on the north side of the street.
- Road B – 10' wide travel lanes with 8' wide parking stalls on the east side of the street for approximately 290' of road, the remainder has no on-street parking.
- Road C – 11' wide travel lanes with 8' wide parking stalls on both the east and west side of the street.
- Road D – private road with 9' wide travel lanes.

By reducing the lane widths of Road B from 11' to 10' we have eliminated ±1,600 square feet of impervious surface. By reducing the lane widths of private Road D from 11' to 9' we have eliminated ±1,000 square feet of impervious surface. Providing on-street parking on only one side of Road A eliminated over 2,300 square feet of impervious surface.

c) Minimize Setbacks & Frontages:

As discussed in the Cluster Development LID we have requested reduced frontage requirements from the zoning regulations in order to provide a more compact design. The decrease in frontage requirements (and depth requirements) for the interior single-family lots has increased the density from what would be 7.26 units per acre to 10.4 units per acre allowing for additional open space to be preserved without the loss in density.

d) Open Space Preservation:

The purpose of open space preservation is to conserve natural and critical environmental areas and maintain pre-development hydraulic characteristics. This project proposes numerous areas for community open space along with conservation areas which include riparian areas along Patrick Brook and LaPlatte River. While some of this community space is set aside to be used for pocket parks and may see improvements made to the existing conditions, other areas will be maintained in a manner similar to their current use.

e) Shared Driveway:

Shared driveways were not incorporated into the design of this project as the site layout does not generally lend itself to providing access to multiple residences in a way that would reduce overall impervious area. Due to the linear nature of the streets, and the intent to mimic portions of both the Creekside neighborhood and HCI, shared driveways were not appropriate for the residences. Shared parking infrastructure is proposed between Buildings A, B & C and between Building C & D in order to reduce impervious surfaces associated with separate parking lots. In addition, shared parking calculations have been provided to reduce the overall parking requirements and eliminate possible unused impervious surface.

f) Site Fingerprinting:

To the greatest extent feasible we have reduced the fingerprint of this development by identifying natural resources and limiting disturbance within these areas. Some of the

techniques used include the identification of existing vegetation to remain, the proposed grading of slopes 3H:1V or steeper to avoid areas of environmental significance, and the use of disconnection as treatment for runoff in limited available areas.

g) Filtration/Infiltration Practices:

Due to the nature of the soils on the site and the shallow depth to the seasonal high groundwater table, infiltration practices were excluded in the stormwater treatment design. The design instead incorporates a bioretention basin (designed to filter) and a gravel wetland which are both classified as Tier 2 STPs by the 2017 Vermont Stormwater Management Manual.

Areas that were identified to have soils conducive to infiltration practices were excluded from consideration due to their location with riparian buffers and the Town of Hinesburg Stream Buffer/Setback.

h) Soil Conservation & Amendments:

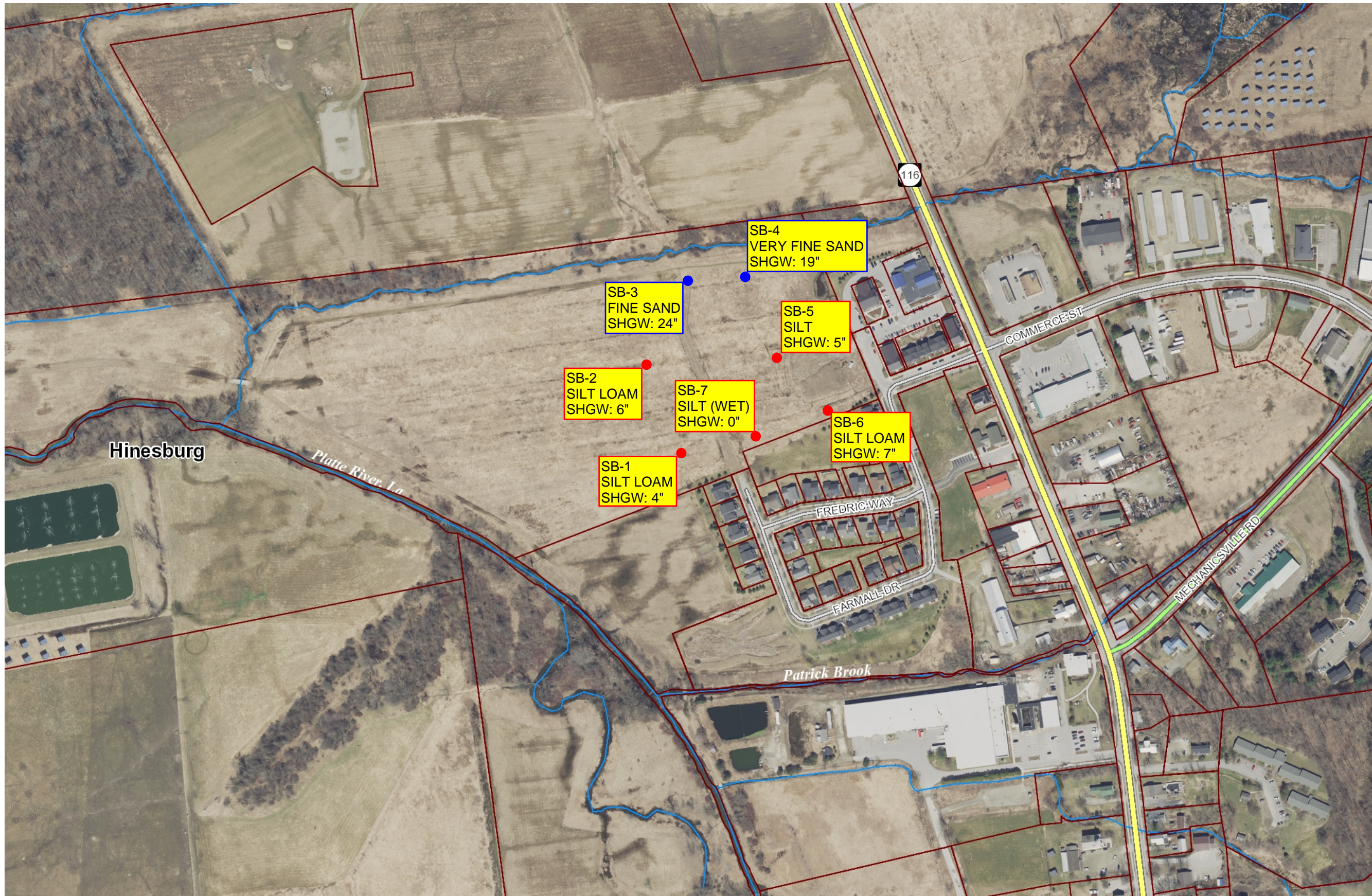
Per the requirements of the 2017 Vermont Stormwater Management Manual a Post-Construction Soil Depth and Quality Plan will be submitted with the final application. This plan delineates the limits of disturbance and the appropriate soil amendments/restoration to take place during and after construction. The intent is to return all pervious areas to their natural state (or better) prior to the initiation of construction.

i) Disconnection of runoff:

Disconnection of impervious surfaces provide stormwater treatment by promoting surface sheet flow and infiltration via natural or engineered vegetation. We are proposing the use of simple disconnection of a number of rooftops which will provide treatment by conveying runoff across lawn and existing meadow space via sheet flow or guttered downspouts with splash pads. Disconnection is an ideal stormwater treatment practice when the impervious being treated does not require detention of larger storm events.

APPENDIX A

SOIL TESTING LOCATIONS



LEGEND

- Parcels (standardized)
- Parcels (non-standardized)
- Roads**
- Interstate
- Principal Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local
- Not part of function Classification System
- Stream/River
- Town Boundary
- SB-X**
"USDA CLASSIFICATION"
"DEPTH TO SHGW"

651.0 0 326.00 651.0 Feet

1: 3,909

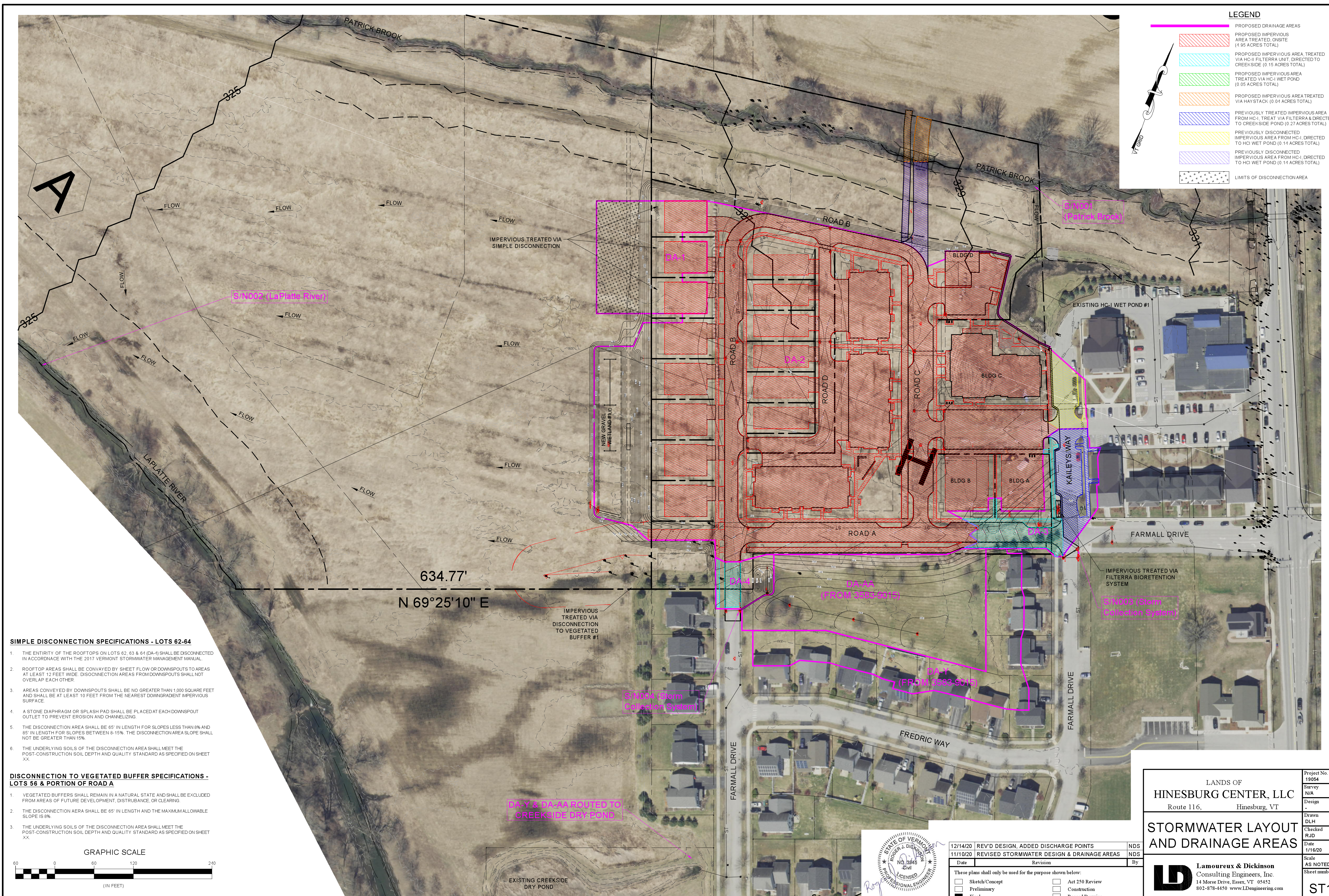
1in = 326 ft.
1cm = 39 meters



NOTES

Map created using ANR's Natural Resources Atlas

APPENDIX B
STORMWATER DRAINAGE AREA MAP



LEGEND

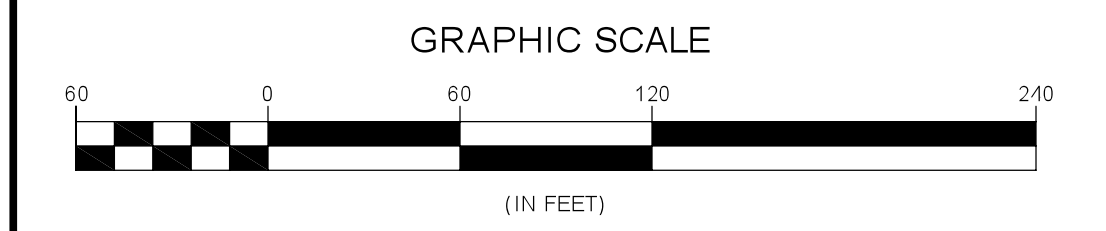
- PROPOSED DRAINAGE AREAS
- PROPOSED IMPERVIOUS AREA TREATED ON-SITE (4.95 ACRES TOTAL)
- PROPOSED IMPERVIOUS AREA TREATED VIA HC-II FILTERRA UNIT, DIRECTED TO CREEKSIDE (0.15 ACRES TOTAL)
- PROPOSED IMPERVIOUS AREA TREATED VIA HC-I WET POND (0.05 ACRES TOTAL)
- PROPOSED IMPERVIOUS AREA TREATED VIA HAY STACK (0.04 ACRES TOTAL)
- PREVIOUSLY TREATED IMPERVIOUS AREA FROM HC-I, TREAT VIA FILTERRA & DIRECTED TO CREEKSIDE POND (0.27 ACRES TOTAL)
- PREVIOUSLY DISCONNECTED IMPERVIOUS AREA FROM HC-I, DIRECTED TO HC-I WET POND (0.14 ACRES TOTAL)
- PREVIOUSLY DISCONNECTED IMPERVIOUS AREA FROM HC-I, DIRECTED TO HC-I WET POND (0.14 ACRES TOTAL)
- LIMITS OF DISCONNECTION AREA

SIMPLE DISCONNECTION SPECIFICATIONS - LOTS 62-64

1. THE ENTIRETY OF THE ROOFTOPS ON LOTS 62, 63 & 64 (DA-1) SHALL BE DISCONNECTED IN ACCORDANCE WITH THE 2017 VERMONT STORMWATER MANAGEMENT MANUAL.
2. ROOFTOP AREAS SHALL BE CONVEYED BY SHEET FLOW OR DOWNSPOUTS TO AREAS AT LEAST 12 FEET WIDE. DISCONNECTION AREAS FROM DOWNSPOUTS SHALL NOT OVERLAP EACH OTHER.
3. AREAS CONVEYED BY DOWNSPOUTS SHALL BE NO GREATER THAN 1,000 SQUARE FEET AND SHALL BE AT LEAST 10 FEET FROM THE NEAREST DOWNGRADIENT IMPERVIOUS SURFACE.
4. A STONE DIAPHRAGM OR SPLASH PAD SHALL BE PLACED AT EACH DOWNSPOUT OUTLET TO PREVENT EROSION AND CHANNELIZING.
5. THE DISCONNECTION AREA SHALL BE 65' IN LENGTH FOR SLOPES LESS THAN 8% AND 85' IN LENGTH FOR SLOPES BETWEEN 8-15%. THE DISCONNECTION AREA SLOPE SHALL NOT BE GREATER THAN 15%.
6. THE UNDERLYING SOILS OF THE DISCONNECTION AREA SHALL MEET THE POST-CONSTRUCTION SOIL DEPTH AND QUALITY STANDARD AS SPECIFIED ON SHEET XX.

DISCONNECTION TO VEGETATED BUFFER SPECIFICATIONS - LOTS 56 & PORTION OF ROAD A

1. VEGETATED BUFFERS SHALL REMAIN IN A NATURAL STATE AND SHALL BE EXCLUDED FROM AREAS OF FUTURE DEVELOPMENT, DISTURBANCE, OR CLEARING.
2. THE DISCONNECTION AREA SHALL BE 65' IN LENGTH AND THE MAXIMUM ALLOWABLE SLOPE IS 8%.
3. THE UNDERLYING SOILS OF THE DISCONNECTION AREA SHALL MEET THE POST-CONSTRUCTION SOIL DEPTH AND QUALITY STANDARD AS SPECIFIED ON SHEET XX.



12/14/20	REV'D DESIGN, ADDED DISCHARGE POINTS	NDS
11/10/20	REVISED STORMWATER DESIGN & DRAINAGE AREAS	NDS
Date	Revision	By
These plans shall only be used for the purpose shown below:		
<input type="checkbox"/>	Sketch/Concept	<input type="checkbox"/>
<input type="checkbox"/>	Preliminary	<input type="checkbox"/>
<input type="checkbox"/>	Final	<input type="checkbox"/>
<input type="checkbox"/>	Act 250 Review	<input type="checkbox"/>
<input type="checkbox"/>	Construction	<input type="checkbox"/>
<input type="checkbox"/>	Record Drawing	<input type="checkbox"/>

LANDS OF
HINESBURG CENTER, LLC
 Route 116, Hinesburg, VT

STORMWATER LAYOUT AND DRAINAGE AREAS

Lamoureux & Dickinson
 Consulting Engineers, Inc.
 14 Morse Drive, Essex, VT 05452
 802-878-4450 www.LDengineering.com

Project No. 19054
 Survey N/A
 Design -
 Drawn DLH
 Checked RJD
 Date 1/16/20
 Scale AS NOTED
 Sheet number **ST1**

APPENDIX C
LAPLATTE RIVER DRAINAGE MAP

StreamStats Report

Region ID: VT

Workspace ID: VT20201012185920629000

Clicked Point (Latitude, Longitude): 44.33290, -73.11807

Time: 2020-10-12 14:59:36 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	17	square miles
LC06STOR	Percentage of water bodies and wetlands determined from the NLCD 2006	5.79	percent
PRECPRI10	Basin average mean annual precipitation for 1981 to 2010 from PRISM	41.3	inches

Peak-Flow Statistics Parameters^[Statewide Peak Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	17	square miles	0.18	689
LC06STOR	Percent Storage from NLCD2006	5.79	percent	0	18.5
PRECPRIS10	Mean Annual Precip PRISM 1981 2010	41.3	inches	33.5	70.4

Peak-Flow Statistics Flow Report^[Statewide Peak Flow]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	Plu	SEp
2 Year Peak Flood	377	ft ³ /s	216	659	34.8
5 Year Peak Flood	580	ft ³ /s	326	1030	36.1
10 Year Peak Flood	734	ft ³ /s	397	1360	38.6
25 Year Peak Flood	955	ft ³ /s	489	1860	42.5
50 Year Peak Flood	1140	ft ³ /s	564	2310	44.9
100 Year Peak Flood	1340	ft ³ /s	641	2800	47.3
200 Year Peak Flood	1560	ft ³ /s	711	3420	50.8
500 Year Peak Flood	1880	ft ³ /s	807	4380	55.2

Peak-Flow Statistics Citations

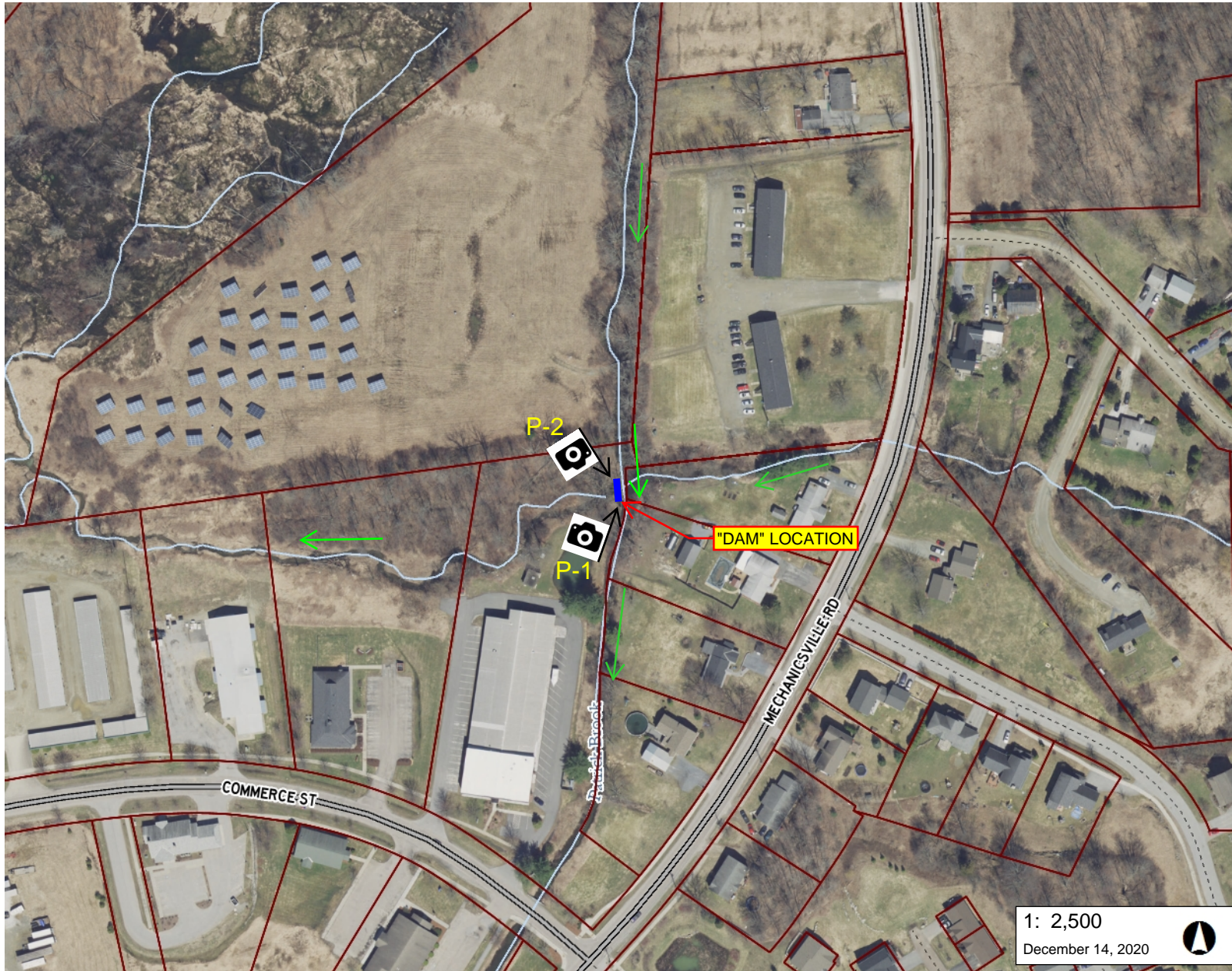
Olson, S.A.,2014, Estimation of flood discharges at selected annual exceedance probabilities for unregulated, rural streams in Vermont, with a section on Vermont regional skew regression, by Veilleux, A.G.: U.S. Geological Survey Scientific Investigations Report 2014–5078, 27 p. plus appendixes. (<http://pubs.usgs.gov/sir/2014/5078/>)

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USGS Product Names Disclaimer: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Application Version: 4.4.0



LEGEND

- Parcels (standardized)
- Roads**
- Interstate
- US Highway; 1
- State Highway
- Town Highway (Class 1)
- Town Highway (Class 2,3)
- Town Highway (Class 4)
- State Forest Trail
- National Forest Trail
- Legal Trail
- Private Road/Driveway
- Proposed Roads
- Stream/River**
- Stream
- Intermittent Stream
- Town Boundary
- PHOTO LOCATION & DIRECTION
- FLOW DIRECTION

1: 2,500
December 14, 2020

NOTES

Map #1

127.0 0 64.00 127.0 Meters
 WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 208 Ft. 1cm = 25 Meters
 © Vermont Agency of Natural Resources THIS MAP IS NOT TO BE USED FOR NAVIGATION

DISCLAIMER: This map is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. ANR and the State of Vermont make no representations of any kind, including but not limited to, the warranties of merchantability, or fitness for a particular use, nor are any such warranties to be implied with respect to the data on this map.



LEGEND

- Parcels (standardized)
- Roads**
 - Interstate
 - US Highway; 1
 - State Highway
 - Town Highway (Class 1)
 - Town Highway (Class 2,3)
 - Town Highway (Class 4)
 - State Forest Trail
 - National Forest Trail
 - Legal Trail
 - Private Road/Driveway
 - Proposed Roads
- Stream/River**
 - Stream
 - Intermittent Stream
- Town Boundary
- PHOTO LOCATION & DIRECTION
- FLOW DIRECTION
- SEGMENT/TRIBUTARY NOT APPARENT

1: 2,500
December 14, 2020

NOTES

Map #2

127.0 0 64.00 127.0 Meters
 WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 208 Ft. 1cm = 25 Meters
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Photo #1 - Patrick Brook "dam" looking north



Photo #2 - Patrick Brook "dam" looking southeast



Photo #3 - south of 765 Mechanicsville Rd looking south



Photo #4 - across from Hinesburg Cemetery entrance looking south

APPENDIX D
STANDARD COMPLIANCE WORKBOOK

Vermont Operational Stormwater Permit - Standards Compliance Workbook

Project Name Hinesburg Center - Phase II

The name above will appear on all the discharge point tabs

Site Summary

Do not fill this tab out, apart from the project name and notes. It will auto-populated based on the values on the discharge point tabs. Discharge points (SN) will only show on the summary if an area has been entered on that tab. Areas listed below are those seeking permit coverage.

		Total	DA1	DA2	DA3	DA4
Impervious	New	5.03	0.22	4.60	0.16	0.05
	Redeveloped	0.00	0.00	0.00	0.00	0.00
	Existing	0.17	0.00	0.00	0.17	0.00
	Previously Authorized	0.00	0.00	0.00	0.00	0.00
	Total	5.20	0.22	4.60	0.33	0.05
Site Area		8.09	0.64	6.85	0.46	0.14
Latitude		44.33051	44.33051	44.33403	44.33328	
Longitude		-73.11897	-73.11897	-73.11341	-73.11512	
Receiving Water		LaPlatte River	LaPlatte River	Town stormwater system to The Canal	Town stormwater system to The Canal	

Recharge

	Total	DA1	DA2	DA3	DA4
Required	0.0056	0.0000	0.0021	0.0035	0.0000
Provided	0.0192	0.0192	0.0000	0.0000	0.0000
Standard met?	Yes	n/a	No	No	n/a

Notes:

Water Quality

	Total	DA1	DA2	DA3	DA4
Required	0.4237	0.0192	0.3735	0.0267	0.0043
Provided	0.3885	0.0192	0.3650	0.0000	0.0043
Standard met?	No	Yes	No	No	Yes

A minimum WQ_v of 0.2" ($P \cdot R_v$) is required for sites with low impervious (<16.67%). This calculation has not been incorporated into this workbook. Designers should check that the minimum WQ_v has been met for their site.

Notes:

Channel Protection

Vermont Operational Stormwater Permit - Standards Compliance Workbook

	Total	DA1	DA2	DA3	DA4
Standard Applies?		No	No	Yes	Yes
Waiver		≥10 sq mi	≥10 sq mi	n/a	n/a
Method		n/a	n/a	Extended Detention	Extended Detention
HC _v	0.5662	0.0245	0.4965	0.0392	0.0059
T _v Provided	0.0192	0.0192	0.0000	0.0000	0.0000

Notes:

Overbank Flood Protection

	DA1	DA2	DA3	DA4
Standard Applies?	No	No	Yes	Yes
Pre-Dev Q (cfs)	0	0	1.77	0.42
Routed, Post-Dev Q (cfs)	0	0	0.05	0.02
Waiver	≥10 sq mi	≥10 sq mi	n/a	n/a

Notes:

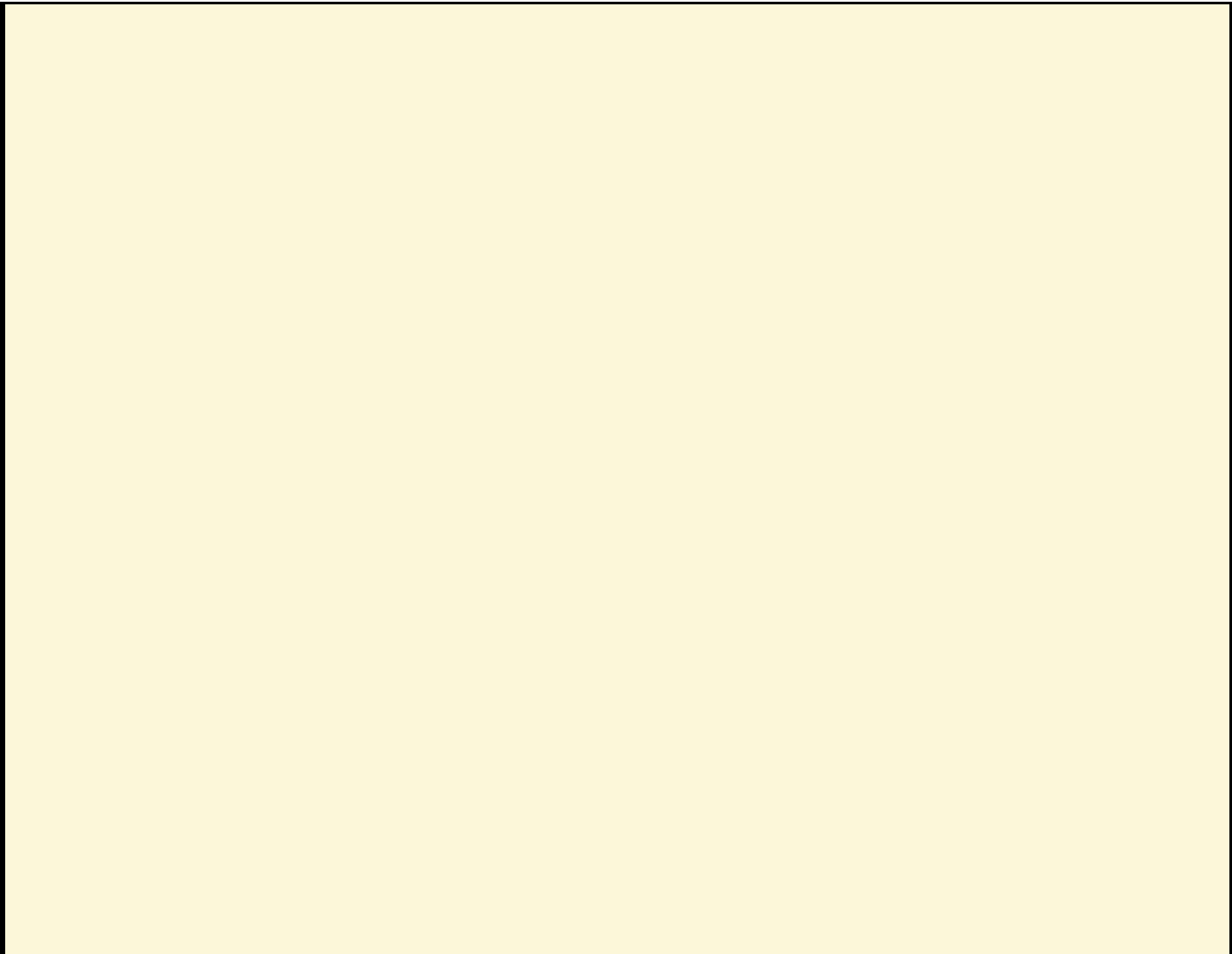
Extreme Flood Protection

	DA1	DA2	DA3	DA4
Standard Applies?	No	No	No	No
Pre-Dev Q (cfs)	0	0	0	0
Routed, Post-Dev Q (cfs)	0	0	0	0
Waiver	< 10 ac impervious	< 10 ac impervious	< 10 ac impervious	< 10 ac impervious

Notes:

General Notes

Vermont Operational Stormwater Permit - Standards Compliance Workbook



Vermont Operational Stormwater Permit - Standards Compliance Workbook

General Discharge Point Information

Project name	Hinesburg Center - Phase II
Discharge point serial number (e.g. S/N 001)	S/N001 (DA-1)
Name of receiving water	LaPlatte River
Latitude (decimal degrees to five decimal places)	44.33051
Longitude (decimal degrees to five decimal places)	-73.11897

Precipitation Data

* Precipitation values shall be obtained from [NOAA Atlas 14](#)

Storm	WQ Storm	1 yr, 24 hr	10 yr, 24 hr	100 yr, 24 hr
Precipitation (inches)	1.00	1.99	3.40	5.08

Drainage Area Information

Pre Development Land Use (acres)

Landuse	A	B	C	D	Total
Grass	0.000	0.000	0.000	0.000	0.000
Meadow	0.000	0.000	0.000	0.640	0.640
Woods	0.000	0.000	0.000	0.000	0.000
Existing Impervious	0.000	0.000	0.000	0.000	0.000
Impervious previously authorized under 2002 VSMM (not included in calculations)					0.000
Total Pre Site Area					0.640

Post Development Land Use (acres)

Landuse	A	B	C	D	Total	%
Grass	0.000	0.000	0.000	0.150	0.150	
Meadow	0.000	0.000	0.000	0.270	0.270	
Woods	0.000	0.000	0.000	0.000	0.000	
New Impervious	0.000	0.000	0.000	0.220	0.220	34.4%
Existing for Permit Coverage (Treated to New Standards)	0.000	0.000	0.000	0.000	0.000	0.0%
Existing Impervious Not for Permit Coverage					0.000	0.0%
Redeveloped Impervious					0.000	0.0%
Impervious previously authorized under 2002 VSMM					0.000	
Total Site Area					0.640	
Total Impervious for Permit Coverage					0.220	
Net Reduced Impervious					0.000	0.0%
Reduced Existing Impervious (for redevelopment)					0.000	0.0%

Information for Calculating T_c by the Watershed Lag Method

	Average Catchment Slope, Y (%)	Hydraulic Length, l (ft)
Pre Development	2	159.90
Post Development	8.333	159.90

Vermont Operational Stormwater Permit - Standards Compliance Workbook

Runoff Calculations	1 yr, 24-hr	10 yr, 24-hr	100 yr, 24-hr
Predevelopment runoff volume (ac-ft)	0.0255	0.0758	0.1483
Pre-routed, post development runoff volume (ac-ft)	0.0501	0.1095	0.1884

Tier 1/Runoff Reduction Practices

List all Tier 1 practices below with the associated treatment volume (T_v). The T_v will be applied to all treatment standards, except for Green Roofs, which do not receive recharge or water quality credit. Please include the appropriate STP worksheet(s) with the application.

Practice	T _v (ac-ft)	Practice	T _v (ac-ft)
Simple Disconnection	0.019		

Runoff Reduction Calculations

Standard	Re	WQ	CP	Q _{P10}	Q _{P100}
T _v Required (ac-ft)	0.0000	0.0192	0.0245	0.0337	0.0401
T _v Provided (ac-ft)	0.0192	0.0192	0.0192	0.0192	0.0192
T _v Remaining (ac-ft)	0.0000	0.0000	0.0053	0.0145	0.0209
Standard met with HCM?	n/a	Yes	No	No	No
Post-Development CN	n/a	91	88	87	86
CN _{adj}	n/a	n/a	81	82	82
Pre-Development CN	n/a	n/a	78	78	78

Groundwater Recharge Standard (Re)

Standard Applicable?	<input type="radio"/> Yes <input checked="" type="radio"/> No	Reason recharge not required (if No is selected):	HSG D Soils
Re _v	0.0000		
Standard met with Tier 1 Practices?	n/a		
Recharge Notes:	Site wide Groundwater Recharge Standard met via simple disconnect (DA-1).		

Vermont Operational Stormwater Permit - Standards Compliance Workbook

Water Quality Treatment Standard (WQ)

	(ac-ft)		Apply Reduction?
WQ _v - New & Existing	0.0192	% Net Reduction	0.0% <input checked="" type="radio"/> No <input type="radio"/> Yes
WQ _v - Redevelopment	0.0000	% Removed Existing Impervious (Redevelopment)	0.0% <input checked="" type="radio"/> No <input type="radio"/> Yes
Total WQ _v	0.0192		
WQ _v met with Tier 1 practices	0.0192	Is all impervious treated by disconnection?	<input type="radio"/> No <input checked="" type="radio"/> Yes (WQ _v met)
WQ _v to be met with Tier 2 and/or Tier 3 practices	N/A		

Tier 2 & 3 Water Quality Practice	WQ _v Provided (ac-ft)	Tier
Total WQ _v Provided (ac-ft)	0.0000	ac-ft
Is the WQ _v Standard met?	Yes	

Water Quality Notes:

Channel Protection Standard (CP)

Standard Applicable?	<input type="radio"/> Yes <input checked="" type="radio"/> No	Waiver (if No is selected):	Direct discharge to drainage area ≥10 sq.mi
Standard Met with HCM?	No	<i>The channel protection standard has not been fully met. Either increase Tv credit to fully meet HCM or provide extended detention.</i>	
Provide Extended Detention for:	0.031 ac-ft		
Warm or Cold Water Fishery?	<input checked="" type="radio"/> Cold <input type="radio"/> Warm	→	Provide: 12 hours of extended detention
See the Vermont Water Quality Standards for warm and cold water designations			OR
			<input type="checkbox"/> The Alternative Extended Detention Method (§2.2.5.4) is being used.

Extended Detention STP:

Modeling Info: When demonstrating CP compliance with extended detention in a hydrologic model, use the CN and T_c below if the practice being modelled is not a Tier 1 practice. The CN_{Adj} takes into account the reduction in runoff volume achieved through Tier 1 practices. The T_c is calculated by the watershed lag method using CN_{Adj} as CN'.

CN _{Adj}	81	Post Development T _c (min)	2.5	(Watershed Lag Method)
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Channel Protection Notes:

Vermont Operational Stormwater Permit - Standards Compliance Workbook

Overbank Flood Protection (Q_{P10})

Standard Applicable? Yes No

Waiver (if No is selected):

Direct discharge to drainage area ≥ 10 sq.mi

Standard Met with HCM?

No

The Q_{P10} standard has not been fully met. Provide additional STPs to ensure post development peak runoff does not exceed pre development peak runoff for the 10 yr, 24 hour storm event.

STP used:

Pre-development peak discharge rate (cfs)

Pre-routed, post-development peak discharge rate (cfs)

Routed, post-development peak discharge rate (cfs)

Modeling Info: When demonstrating Q_{P10} compliance in a hydrologic model, use the following CN and T_c below, if the practice used to meet Q_{P10} is not itself a Tier 1 practice. The CN_{Adj} takes into account the reduction in runoff volume achieved through Tier 1 practices. The T_c is calculated by the watershed lag method using CN_{Adj} as CN'.

Pre-Development CN (Flow-weighted composite)	78	Pre Development T_c (min)	5.5	(Watershed Lag Method)
CN_{Adj}	82	Post Development T_c (min)	2.4	

Overbank Flood Notes:

Extreme Flood Protection (Q_{P100})

Standard Applicable? Yes No

Waiver (if No is selected):

<10 acres impervious

Standard Met with HCM?

No

The extreme standard has not been fully met. Provide additional STPs to ensure post development peak runoff does not exceed pre development peak runoff for the 100 yr, 24 hour storm event.

STP used:

Pre-development peak discharge rate (cfs)

Pre-routed, post-development peak discharge rate (cfs)

Routed, post-development peak discharge rate (cfs)

Modeling Info: When demonstrating Q_{P100} compliance in a hydrologic model, use the following CN and T_c below, if the practice used to meet Q_{P100} is not a Tier 1 practice. The CN_{Adj} takes into account the reduction in runoff volume achieved through runoff reduction practices. The T_c is calculated by the watershed lag method using CN_{Adj} as CN'.

Pre-Development CN (Flow-weighted composite)	78	Pre Development T_c (min)	5.5	(Watershed Lag Method)
CN_{Adj}	82	Post Development T_c (min)	2.4	

Extreme Flood Notes:

Vermont Operational Stormwater Permit - Standards Compliance Workbook

General Discharge Point Information

Project name	Hinesburg Center - Phase II
Discharge point serial number (e.g. S/N 001)	S/N001 (DA-2)
Name of receiving water	LaPlatte River
Latitude (decimal degrees to five decimal places)	44.33051
Longitude (decimal degrees to five decimal places)	-73.11897

Precipitation Data

* Precipitation values shall be obtained from [NOAA Atlas 14](#)

Storm	WQ Storm	1 yr, 24 hr	10 yr, 24 hr	100 yr, 24 hr
Precipitation (inches)	1.00	1.99	3.40	5.08

Drainage Area Information

Pre Development Land Use (acres)

Landuse	A	B	C	D	Total
Grass	0.000	0.000	0.030	0.000	0.030
Meadow	0.000	0.000	0.120	6.600	6.720
Woods	0.000	0.000	0.000	0.000	0.000
Existing Impervious	0.000	0.000	0.100	0.000	0.100
Impervious previously authorized under 2002 VSMM (not included in calculations)					0.000
Total Pre Site Area					6.850

Post Development Land Use (acres)

Landuse	A	B	C	D	Total	%
Grass	0.000	0.000	0.150	2.100	2.250	
Meadow	0.000	0.000	0.000	0.000	0.000	
Woods	0.000	0.000	0.000	0.000	0.000	
New Impervious	0.000	0.000	0.100	4.500	4.600	67.2%
Existing for Permit Coverage (Treated to New Standards)	0.000	0.000	0.000	0.000	0.000	0.0%
Existing Impervious Not for Permit Coverage					0.000	0.0%
Redeveloped Impervious					0.000	0.0%
Impervious previously authorized under 2002 VSMM					0.000	
Total Site Area					6.850	
Total Impervious for Permit Coverage					4.600	
Net Reduced Impervious					0.000	0.0%
Reduced Existing Impervious (for redevelopment)					0.100	100.0%

Information for Calculating T_c by the Watershed Lag Method

	Average Catchment Slope, Y (%)	Hydraulic Length, l (ft)
Pre Development	4.5	663.07
Post Development	5.5	663.07

Vermont Operational Stormwater Permit - Standards Compliance Workbook

Runoff Calculations	1 yr, 24-hr	10 yr, 24-hr	100 yr, 24-hr
Predevelopment runoff volume (ac-ft)	0.2815	0.8213	1.5971
Pre-routed, post development runoff volume (ac-ft)	0.7781	1.5011	2.4053

Tier 1/Runoff Reduction Practices

List all Tier 1 practices below with the associated treatment volume (T_v). The T_v will be applied to all treatment standards, except for Green Roofs, which do not receive recharge or water quality credit. Please include the appropriate STP worksheet(s) with the application.

Practice	T _v (ac-ft)	Practice	T _v (ac-ft)

Runoff Reduction Calculations

Standard	Re	WQ	CP	Q _{P10}	Q _{P100}
T _v Required (ac-ft)	0.0021	0.3735	0.4965	0.6798	0.8083
T _v Provided (ac-ft)	0.0000	0.0000	0.0000	0.0000	0.0000
T _v Remaining (ac-ft)	0.0021	0.3735	0.4965	0.6798	0.8083
Standard met with HCM?	No	No	No	No	No
Post-Development CN	n/a	96	94	93	92
CN _{adj}	n/a	96	94	93	92
Pre-Development CN	n/a	n/a	78	78	78

Groundwater Recharge Standard (Re)

Standard Applicable?	<input checked="" type="radio"/> Yes <input type="radio"/> No	
Re _v	0.0021	
Standard met with Tier 1 Practices?	No	<i>NOTE: Treatment provided is insufficient to meet the recharge standard within this drainage area. Add more infiltrating practices unless recharge is being met site-wide. (check summary tab)</i>
Recharge Notes:	Site wide Groundwater Recharge Standard met via simple disconnect (DA-1).	

Vermont Operational Stormwater Permit - Standards Compliance Workbook

Water Quality Treatment Standard (WQ)

	(ac-ft)		Apply Reduction?
WQ _v - New & Existing	0.3735	% Net Reduction	0.0% <input checked="" type="radio"/> No <input type="radio"/> Yes
WQ _v - Redevelopment	0.0000	% Removed Existing Impervious (Redevelopment)	100.0% <input checked="" type="radio"/> No <input type="radio"/> Yes Max 25% applied
Total WQ _v	0.3735		
WQ _v met with Tier 1 practices	0.0000	Is all impervious treated by disconnection?	<input checked="" type="radio"/> No <input type="radio"/> Yes (WQ _v met)
WQ _v to be met with Tier 2 and/or Tier 3 practices	0.3735		

NOTE: Please include a copy of the appropriate STP worksheet(s) with the application.

Tier 2 & 3 Water Quality Practice	WQ _v Provided (ac-ft)	Tier
Gravel Wetland	0.3650	Tier 2
Total WQ _v Provided (ac-ft)	0.3650	ac-ft
Is the WQ _v Standard met?	No	

NOTE: Add more water quality practices unless site balancing is being used. (Check summary tab)

Water Quality Notes:

Channel Protection Standard (CP)

Standard Applicable?	<input type="radio"/> Yes <input checked="" type="radio"/> No	Waiver (if No is selected):	Direct discharge to drainage area ≥10 sq.mi
Standard Met with HCM?	No	<i>The channel protection standard has not been fully met. Either increase T_v credit to fully meet HCM or provide extended detention.</i>	
Provide Extended Detention for:	0.778 ac-ft		
Warm or Cold Water Fishery?	<input checked="" type="radio"/> Cold <input type="radio"/> Warm	→	Provide: 12 hours of extended detention
			OR
			<input type="checkbox"/> The Alternative Extended Detention Method (§2.2.5.4) is being used.
Extended Detention STP:			

Modeling Info: When demonstrating CP compliance with extended detention in a hydrologic model, use the CN and T_c below if the practice being modelled is not a Tier 1 practice. The CN_{Adj} takes into account the reduction in runoff volume achieved through Tier 1 practices. The T_c is calculated by the watershed lag method using CN_{Adj} as CN'.

CN _{Adj}	94	Post Development T _c (min)	5.8 (Watershed Lag Method)
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Channel Protection Notes:

Vermont Operational Stormwater Permit - Standards Compliance Workbook

Overbank Flood Protection (Q_{P10})

Standard Applicable? Yes No

Waiver (if No is selected):

Direct discharge to drainage
area ≥ 10 sq.mi

Standard Met with HCM?

No

The Q_{P10} standard has not been fully met. Provide additional STPs to ensure post development peak runoff does not exceed pre development peak runoff for the 10 yr, 24 hour storm event.

STP used:

Pre-development peak discharge rate (cfs)

Pre-routed, post-development peak discharge rate (cfs)

Routed, post-development peak discharge rate (cfs)

Modeling Info: When demonstrating Q_{P10} compliance in a hydrologic model, use the following CN and T_c below, if the practice used to meet Q_{P10} is not itself a Tier 1 practice. The CN_{Adj} takes into account the reduction in runoff volume achieved through Tier 1 practices. The T_c is calculated by the watershed lag method using CN_{Adj} as CN'.

Pre-Development CN (Flow-weighted composite)	78	Pre Development T_c (min)	11.4	(Watershed Lag Method)
CN_{Adj}	93	Post Development T_c (min)	6.0	

Overbank Flood Notes:

Extreme Flood Protection (Q_{P100})

Standard Applicable? Yes No

Waiver (if No is selected):

<10 acres impervious

Standard Met with HCM?

No

The extreme standard has not been fully met. Provide additional STPs to ensure post development peak runoff does not exceed pre development peak runoff for the 100 yr, 24 hour storm event.

STP used:

Pre-development peak discharge rate (cfs)

Pre-routed, post-development peak discharge rate (cfs)

Routed, post-development peak discharge rate (cfs)

Modeling Info: When demonstrating Q_{P100} compliance in a hydrologic model, use the following CN and T_c below, if the practice used to meet Q_{P100} is not a Tier 1 practice. The CN_{Adj} takes into account the reduction in runoff volume achieved through runoff reduction practices. The T_c is calculated by the watershed lag method using CN_{Adj} as CN'.

Pre-Development CN (Flow-weighted composite)	78	Pre Development T_c (min)	11.4	(Watershed Lag Method)
CN_{Adj}	92	Post Development T_c (min)	6.2	

Extreme Flood Notes:

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General Discharge Point Information

Project name	Hinesburg Center - Phase II
Discharge point serial number (e.g. S/N 001)	S/N003 (DA-3)
Name of receiving water	Town stormwater system to The Canal
Latitude (decimal degrees to five decimal places)	44.33403
Longitude (decimal degrees to five decimal places)	-73.11341

Precipitation Data

* Precipitation values shall be obtained from [NOAA Atlas 14](#)

Storm	WQ Storm	1 yr, 24 hr	10 yr, 24 hr	100 yr, 24 hr
Precipitation (inches)	1.00	1.99	3.40	5.08

Drainage Area Information

Pre Development Land Use (acres)

Landuse	A	B	C	D	Total
Grass	0.000	0.000	0.060	0.000	0.060
Meadow	0.000	0.000	0.000	0.230	0.230
Woods	0.000	0.000	0.000	0.000	0.000
Existing Impervious	0.000	0.000	0.170	0.000	0.170
Impervious previously authorized under 2002 VSMM (not included in calculations)					0.000
Total Pre Site Area					0.460

Post Development Land Use (acres)

Landuse	A	B	C	D	Total	%
Grass	0.000	0.000	0.060	0.070	0.130	
Meadow	0.000	0.000	0.000	0.000	0.000	
Woods	0.000	0.000	0.000	0.000	0.000	
New Impervious	0.000	0.000	0.000	0.160	0.160	34.8%
Existing for Permit Coverage (Treated to New Standards)	0.000	0.000	0.170	0.000	0.170	37.0%
Existing Impervious Not for Permit Coverage					0.000	0.0%
Redeveloped Impervious					0.000	0.0%
Impervious previously authorized under 2002 VSMM					0.000	
Total Site Area					0.460	
Total Impervious for Permit Coverage					0.330	
Net Reduced Impervious					0.000	0.0%
Reduced Existing Impervious (for redevelopment)					0.000	0.0%

Information for Calculating T_c by the Watershed Lag Method

	Average Catchment Slope, Y (%)	Hydraulic Length, l (ft)
Pre Development	2	131.16
Post Development	4.5	131.16

Vermont Operational Stormwater Permit - Standards Compliance Workbook

Runoff Calculations	1 yr, 24-hr	10 yr, 24-hr	100 yr, 24-hr
Predevelopment runoff volume (ac-ft)	0.0359	0.0780	0.1340
Pre-routed, post development runoff volume (ac-ft)	0.0535	0.1020	0.1626

Tier 1/Runoff Reduction Practices

List all Tier 1 practices below with the associated treatment volume (T_v). The T_v will be applied to all treatment standards, except for Green Roofs, which do not receive recharge or water quality credit. Please include the appropriate STP worksheet(s) with the application.

Practice	T _v (ac-ft)	Practice	T _v (ac-ft)

Runoff Reduction Calculations

Standard	Re	WQ	CP	Q _{P10}	Q _{P100}
T _v Required (ac-ft)	0.0035	0.0267	0.0392	0.0555	0.0675
T _v Provided (ac-ft)	0.0000	0.0000	0.0000	0.0000	0.0000
T _v Remaining (ac-ft)	0.0035	0.0267	0.0392	0.0555	0.0675
Standard met with HCM?	No	No	No	No	No
Post-Development CN	n/a	97	94	93	93
CN _{adj}	n/a	97	94	93	93
Pre-Development CN	n/a	n/a	88	86	86

Groundwater Recharge Standard (Re)

Standard Applicable?	<input checked="" type="radio"/> Yes <input type="radio"/> No	
Re _v	0.0035	
Standard met with Tier 1 Practices?	No	NOTE: Treatment provided is insufficient to meet the recharge standard within this drainage area. Add more infiltrating practices unless recharge is being met site-wide. (check summary tab)
Recharge Notes:	Site wide Groundwater Recharge Standard met via simple disconnect (DA-1).	

Vermont Operational Stormwater Permit - Standards Compliance Workbook

Water Quality Treatment Standard (WQ)

	(ac-ft)		Apply Reduction?
WQ _v - New & Existing	0.0267	% Net Reduction	0.0% <input checked="" type="radio"/> No <input type="radio"/> Yes
WQ _v - Redevelopment	0.0000	% Removed Existing Impervious (Redevelopment)	0.0% <input checked="" type="radio"/> No <input type="radio"/> Yes
Total WQ _v	0.0267		
WQ _v met with Tier 1 practices	0.0000	Is all impervious treated by disconnection?	<input checked="" type="radio"/> No <input type="radio"/> Yes (WQ _v met)
WQ _v to be met with Tier 2 and/or Tier 3 practices	0.0267		

Tier 2 & 3 Water Quality Practice	WQ _v Provided (ac-ft)	Tier
Total WQ _v Provided (ac-ft)	0.0000	ac-ft
Is the WQ _v Standard met?	No	

NOTE: Add more water quality practices unless site balancing is being used. (Check summary tab)

Water Quality Notes: We are utilizing proprietary devices to provide WQ_v treatment. The proprietary devices selected are two Contech Filterra Units (model FTIBC1006), which have received approval as an Alternative Treatment Practice as a Tier 2 Practice.

Channel Protection Standard (CP)

Standard Applicable?	<input checked="" type="radio"/> Yes <input type="radio"/> No	
Standard Met with HCM?	No	<i>The channel protection standard has not been fully met. Either increase T_v credit to fully meet HCM or provide extended detention.</i>
Provide Extended Detention for:	0.053	ac-ft
Warm or Cold Water Fishery?	<input checked="" type="radio"/> Cold <input type="radio"/> Warm	→ Provide: 12 hours of extended detention
		OR <input type="checkbox"/> The Alternative Extended Detention Method (§2.2.5.4) is being used.
Extended Detention STP:	Underground Pipe Storage	

[See the Vermont Water Quality Standards for warm and cold water designations](#)

Modeling Info: When demonstrating CP compliance with extended detention in a hydrologic model, use the CN and T_c below if the practice being modelled is not a Tier 1 practice. The CN_{Adj} takes into account the reduction in runoff volume achieved through Tier 1 practices. The T_c is calculated by the watershed lag method using CN_{Adj} as CN'.

CN _{Adj}	94	Post Development T _c (min)	1.7 (Watershed Lag Method)
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Channel Protection Notes: Minimum orifice size used.

Vermont Operational Stormwater Permit - Standards Compliance Workbook

Overbank Flood Protection (Q_{P10})

Standard Applicable? Yes No

Standard Met with HCM?

No

The Q_{P10} standard has not been fully met. Provide additional STPs to ensure post development peak runoff does not exceed pre development peak runoff for the 10 yr, 24 hour storm event.

STP used: Underground Pipe Storage

Pre-development peak discharge rate (cfs)	1.77
Pre-routed, post-development peak discharge rate (cfs)	2.30
Routed, post-development peak discharge rate (cfs)	0.05

Modeling Info: When demonstrating Q_{P10} compliance in a hydrologic model, use the following CN and T_c below, if the practice used to meet Q_{P10} is not itself a Tier 1 practice. The CN_{Adj} takes into account the reduction in runoff volume achieved through Tier 1 practices. The T_c is calculated by the watershed lag method using CN_{Adj} as CN'.

Pre-Development CN (Flow-weighted composite)	86	Pre Development T_c (min)	3.6	(Watershed Lag Method)
CN_{Adj}	93	Post Development T_c (min)	1.8	

Overbank Flood Notes: Minimum orifice size used.

Extreme Flood Protection (Q_{P100})

Standard Applicable? Yes No

Waiver (if No is selected):

<10 acres impervious

Standard Met with HCM?

No

The extreme standard has not been fully met. Provide additional STPs to ensure post development peak runoff does not exceed pre development peak runoff for the 100 yr, 24 hour storm event.

STP used:

Pre-development peak discharge rate (cfs)	
Pre-routed, post-development peak discharge rate (cfs)	
Routed, post-development peak discharge rate (cfs)	

Modeling Info: When demonstrating Q_{P100} compliance in a hydrologic model, use the following CN and T_c below, if the practice used to meet Q_{P100} is not a Tier 1 practice. The CN_{Adj} takes into account the reduction in runoff volume achieved through runoff reduction practices. The T_c is calculated by the watershed lag method using CN_{Adj} as CN'.

Pre-Development CN (Flow-weighted composite)	86	Pre Development T_c (min)	3.7	(Watershed Lag Method)
CN_{Adj}	93	Post Development T_c (min)	1.8	

Extreme Flood Notes:

Vermont Operational Stormwater Permit - Standards Compliance Workbook

General Discharge Point Information

Project name	Hinesburg Center - Phase II
Discharge point serial number (e.g. S/N 001)	S/N003 (DA-4)
Name of receiving water	Town stormwater system to The Canal
Latitude (decimal degrees to five decimal places)	44.33328
Longitude (decimal degrees to five decimal places)	-73.11512

Precipitation Data

* Precipitation values shall be obtained from [NOAA Atlas 14](#)

Storm	WQ Storm	1 yr, 24 hr	10 yr, 24 hr	100 yr, 24 hr
Precipitation (inches)	1.00	1.99	3.40	5.08

Drainage Area Information

Pre Development Land Use (acres)

Landuse	A	B	C	D	Total
Grass	0.000	0.000	0.000	0.000	0.000
Meadow	0.000	0.000	0.000	0.140	0.140
Woods	0.000	0.000	0.000	0.000	0.000
Existing Impervious	0.000	0.000	0.000	0.000	0.000
Impervious previously authorized under 2002 VSMM (not included in calculations)					0.000
Total Pre Site Area					0.140

Post Development Land Use (acres)

Landuse	A	B	C	D	Total	%
Grass	0.000	0.000	0.000	0.090	0.090	
Meadow	0.000	0.000	0.000	0.000	0.000	
Woods	0.000	0.000	0.000	0.000	0.000	
New Impervious	0.000	0.000	0.000	0.050	0.050	35.7%
Existing for Permit Coverage (Treated to New Standards)	0.000	0.000	0.000	0.000	0.000	0.0%
Existing Impervious Not for Permit Coverage					0.000	0.0%
Redeveloped Impervious					0.000	0.0%
Impervious previously authorized under 2002 VSMM					0.000	
Total Site Area					0.140	
Total Impervious for Permit Coverage					0.050	
Net Reduced Impervious					0.000	0.0%
Reduced Existing Impervious (for redevelopment)					0.000	0.0%

Information for Calculating T_c by the Watershed Lag Method

	Average Catchment Slope, Y (%)	Hydraulic Length, l (ft)
Pre Development	5	64.24
Post Development	15	64.24

Vermont Operational Stormwater Permit - Standards Compliance Workbook

Runoff Calculations	1 yr, 24-hr	10 yr, 24-hr	100 yr, 24-hr
Predevelopment runoff volume (ac-ft)	0.0056	0.0166	0.0324
Pre-routed, post development runoff volume (ac-ft)	0.0115	0.0249	0.0424

Tier 1/Runoff Reduction Practices

List all Tier 1 practices below with the associated treatment volume (T_v). The T_v will be applied to all treatment standards, except for Green Roofs, which do not receive recharge or water quality credit. Please include the appropriate STP worksheet(s) with the application.

Practice	T _v (ac-ft)	Practice	T _v (ac-ft)

Runoff Reduction Calculations

Standard	Re	WQ	CP	Q _{P10}	Q _{P100}
T _v Required (ac-ft)	0.0000	0.0043	0.0059	0.0083	0.0100
T _v Provided (ac-ft)	0.0000	0.0000	0.0000	0.0000	0.0000
T _v Remaining (ac-ft)	0.0000	0.0043	0.0059	0.0083	0.0100
Standard met with HCM?	n/a	Yes	No	No	No
Post-Development CN	n/a	91	88	87	87
CN _{adj}	n/a	91	88	87	87
Pre-Development CN	n/a	n/a	78	78	78

Groundwater Recharge Standard (Re)

Standard Applicable?	<input type="radio"/> Yes <input checked="" type="radio"/> No	Reason recharge not required (if No is selected):	HSG D Soils
Re _v	0.0000		
Standard met with Tier 1 Practices?	n/a		
Recharge Notes:	Site wide Groundwater Recharge Standard met via simple disconnect (DA-1).		

Vermont Operational Stormwater Permit - Standards Compliance Workbook

Water Quality Treatment Standard (WQ)

	(ac-ft)		Apply Reduction?
WQ _v - New & Existing	0.0043	% Net Reduction	0.0% <input checked="" type="radio"/> No <input type="radio"/> Yes
WQ _v - Redevelopment	0.0000	% Removed Existing Impervious (Redevelopment)	0.0% <input checked="" type="radio"/> No <input type="radio"/> Yes
Total WQ _v	0.0043		
WQ _v met with Tier 1 practices	0.0000	Is all impervious treated by disconnection?	<input type="radio"/> No <input checked="" type="radio"/> Yes (WQ _v met)
WQ _v to be met with Tier 2 and/or Tier 3 practices	N/A		

NOTE: Please include a copy of the appropriate STP worksheet(s) with the application.

Tier 2 & 3 Water Quality Practice	WQ _v Provided (ac-ft)	Tier
Bioretention (not designed to infiltrate)	0.0043	Tier 2
Total WQ _v Provided (ac-ft)	0.0043	ac-ft
Is the WQ _v Standard met?	Yes	

Water Quality Notes:

Channel Protection Standard (CP)

Standard Applicable?	<input checked="" type="radio"/> Yes <input type="radio"/> No	
Standard Met with HCM?	No	<i>The channel protection standard has not been fully met. Either increase T_v credit to fully meet HCM or provide extended detention.</i>
Provide Extended Detention for:	0.012 ac-ft	
Warm or Cold Water Fishery?	<input checked="" type="radio"/> Cold <input type="radio"/> Warm	→ Provide: 12 hours of extended detention
		OR <input type="checkbox"/> The Alternative Extended Detention Method (§2.2.5.4) is being used.
Extended Detention STP:	Bioretention Basin	

[See the Vermont Water Quality Standards for warm and cold water designations](#)

Modeling Info: When demonstrating CP compliance with extended detention in a hydrologic model, use the CN and T_c below if the practice being modelled is not a Tier 1 practice. The CN_{Adj} takes into account the reduction in runoff volume achieved through Tier 1 practices. The T_c is calculated by the watershed lag method using CN_{Adj} as CN'.

CN _{Adj}	88	Post Development T _c (min)	0.7 (Watershed Lag Method)
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Channel Protection Notes:

All runoff detained and filtering through media.

Vermont Operational Stormwater Permit - Standards Compliance Workbook

Overbank Flood Protection (Q_{P10})

Standard Applicable? Yes No

Standard Met with HCM?

No

The Q_{P10} standard has not been fully met. Provide additional STPs to ensure post development peak runoff does not exceed pre development peak runoff for the 10 yr, 24 hour storm event.

STP used: Bioretention Basin

Pre-development peak discharge rate (cfs)	0.42
Pre-routed, post-development peak discharge rate (cfs)	0.61
Routed, post-development peak discharge rate (cfs)	0.02

Modeling Info: When demonstrating Q_{P10} compliance in a hydrologic model, use the following CN and T_c below, if the practice used to meet Q_{P10} is not itself a Tier 1 practice. The CN_{Adj} takes into account the reduction in runoff volume achieved through Tier 1 practices. The T_c is calculated by the watershed lag method using CN_{Adj} as CN'.

Pre-Development CN (Flow-weighted composite)	78	Pre Development T_c (min)	1.7	(Watershed Lag Method)
CN_{Adj}	87	Post Development T_c (min)	0.7	

Overbank Flood Notes:

Extreme Flood Protection (Q_{P100})

Standard Applicable? Yes No

Waiver (if No is selected):

<10 acres impervious

Standard Met with HCM?

No

The extreme standard has not been fully met. Provide additional STPs to ensure post development peak runoff does not exceed pre development peak runoff for the 100 yr, 24 hour storm event.

STP used:

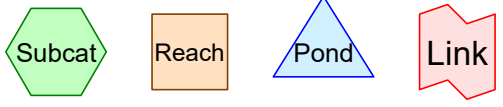
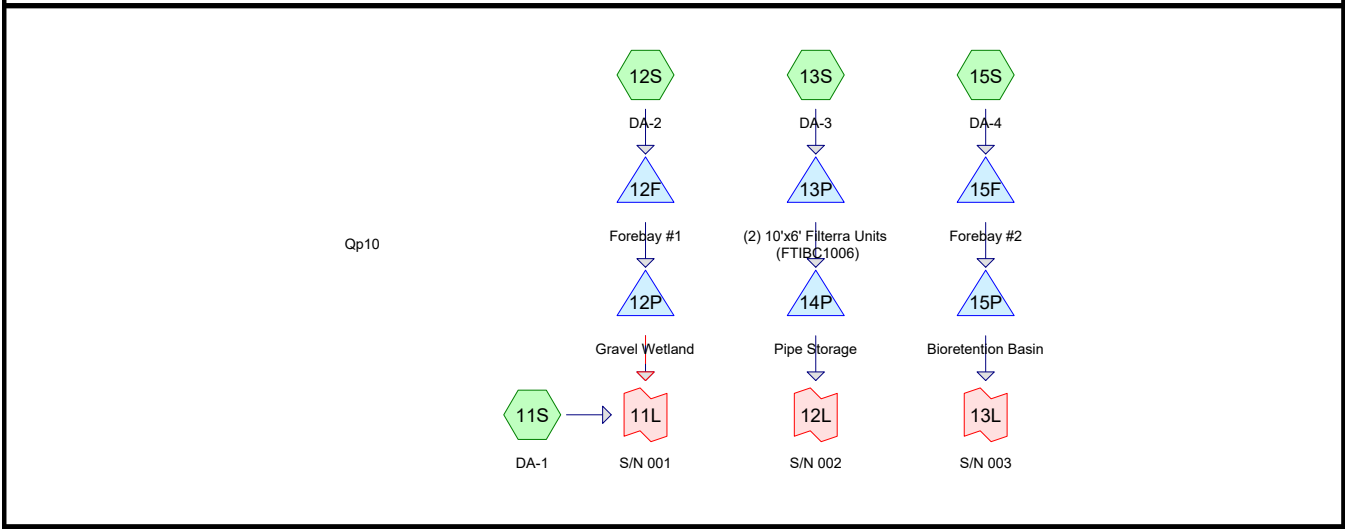
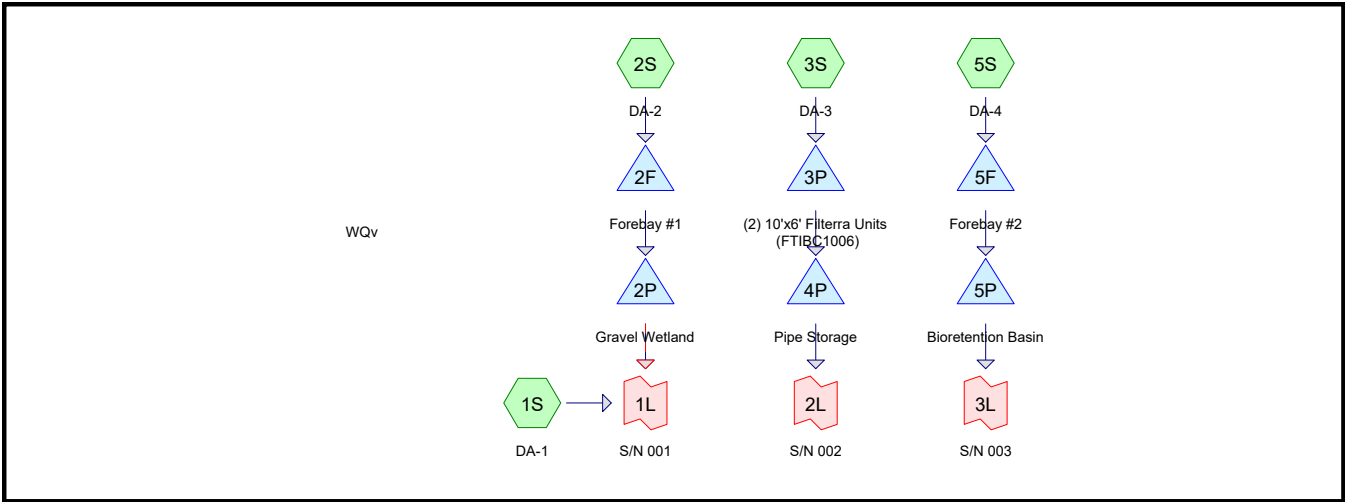
Pre-development peak discharge rate (cfs)	
Pre-routed, post-development peak discharge rate (cfs)	
Routed, post-development peak discharge rate (cfs)	

Modeling Info: When demonstrating Q_{P100} compliance in a hydrologic model, use the following CN and T_c below, if the practice used to meet Q_{P100} is not a Tier 1 practice. The CN_{Adj} takes into account the reduction in runoff volume achieved through runoff reduction practices. The T_c is calculated by the watershed lag method using CN_{Adj} as CN'.

Pre-Development CN (Flow-weighted composite)	78	Pre Development T_c (min)	1.7	(Watershed Lag Method)
CN_{Adj}	87	Post Development T_c (min)	0.7	

Extreme Flood Notes:

APPENDIX E
STATE TREATMENT MODELLING
(HCII - WQ_v, CP_v, Q_{p10})



19054-HCII**Type II 24-hr WQv Rainfall=1.00"**

Prepared by VHB

Printed 5/5/2022

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Time span=0.00-120.00 hrs, dt=0.01 hrs, 12001 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-1 Runoff Area=0.640 ac 0.00% Impervious Runoff Depth=0.36"
 Flow Length=160' Slope=0.0833 '/' Tc=1.7 min CN=91 Runoff=0.49 cfs 0.019 af

Subcatchment2S: DA-2 Runoff Area=6.850 ac 0.00% Impervious Runoff Depth=0.63"
 Flow Length=663' Slope=0.0550 '/' Tc=5.2 min CN=96 Runoff=7.75 cfs 0.360 af

Subcatchment3S: DA-3 Runoff Area=0.460 ac 0.00% Impervious Runoff Depth=0.71"
 Flow Length=131' Slope=0.0450 '/' Tc=1.5 min CN=97 Runoff=0.64 cfs 0.027 af

Subcatchment5S: DA-4 Runoff Area=0.140 ac 0.00% Impervious Runoff Depth=0.36"
 Flow Length=64' Slope=0.1500 '/' Tc=0.6 min CN=91 Runoff=0.11 cfs 0.004 af

Pond 2F: Forebay #1 Peak Elev=328.27' Storage=3,842 cf Inflow=7.75 cfs 0.360 af
 Outflow=7.49 cfs 0.360 af

Pond 2P: Gravel Wetland Peak Elev=328.03' Storage=18,270 cf Inflow=7.49 cfs 0.360 af
 Primary=0.08 cfs 0.360 af Secondary=0.00 cfs 0.000 af Outflow=0.08 cfs 0.360 af

Pond 3P: (2) 10'x6' Filterra Units (FTIBC1006) Peak Elev=328.83' Storage=74 cf Inflow=0.64 cfs 0.027 af
 Outflow=0.39 cfs 0.027 af

Pond 4P: Pipe Storage Peak Elev=326.31' Storage=0.014 af Inflow=0.39 cfs 0.027 af
 Outflow=0.03 cfs 0.027 af

Pond 5F: Forebay #2 Peak Elev=328.53' Storage=314 cf Inflow=0.11 cfs 0.004 af
 Outflow=0.10 cfs 0.004 af

Pond 5P: Bioretention Basin Peak Elev=328.39' Storage=105 cf Inflow=0.10 cfs 0.004 af
 Outflow=0.00 cfs 0.004 af

Link 1L: S/N 001 Inflow=0.54 cfs 0.379 af
 Primary=0.54 cfs 0.379 af

Link 2L: S/N 002 Inflow=0.03 cfs 0.027 af
 Primary=0.03 cfs 0.027 af

Link 3L: S/N 003 Inflow=0.00 cfs 0.004 af
 Primary=0.00 cfs 0.004 af

Total Runoff Area = 8.090 ac Runoff Volume = 0.410 af Average Runoff Depth = 0.61"
100.00% Pervious = 8.090 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: DA-1

Runoff = 0.49 cfs @ 11.92 hrs, Volume= 0.019 af, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Type II 24-hr WQv Rainfall=1.00"

Area (ac)	CN	Description
* 0.640	91	Modified CN
0.640	91	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	160	0.0833	1.56		Lag/CN Method, LAG

Summary for Subcatchment 2S: DA-2

Runoff = 7.75 cfs @ 11.96 hrs, Volume= 0.360 af, Depth= 0.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Type II 24-hr WQv Rainfall=1.00"

Area (ac)	CN	Description
* 6.850	96	Modified CN
6.850	96	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.2	663	0.0550	2.13		Lag/CN Method, LAG

Summary for Subcatchment 3S: DA-3

Runoff = 0.64 cfs @ 11.92 hrs, Volume= 0.027 af, Depth= 0.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Type II 24-hr WQv Rainfall=1.00"

Area (ac)	CN	Description
* 0.460	97	Modified CN
0.460	97	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	131	0.0450	1.47		Lag/CN Method, LAG

Summary for Subcatchment 5S: DA-4

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.11 cfs @ 11.91 hrs, Volume= 0.004 af, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr WQv Rainfall=1.00"

Area (ac)	CN	Description
* 0.140	91	Modified CN
0.140	91	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	64	0.1500	1.74		Lag/CN Method, LAG

Summary for Pond 2F: Forebay #1

Inflow Area = 6.850 ac, 0.00% Impervious, Inflow Depth = 0.63" for WQv event
 Inflow = 7.75 cfs @ 11.96 hrs, Volume= 0.360 af
 Outflow = 7.49 cfs @ 11.98 hrs, Volume= 0.360 af, Atten= 3%, Lag= 1.1 min
 Primary = 7.49 cfs @ 11.98 hrs, Volume= 0.360 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Starting Elev= 328.00' Surf.Area= 2,628 sf Storage= 3,057 cf
 Peak Elev= 328.27' @ 11.98 hrs Surf.Area= 3,233 sf Storage= 3,842 cf (785 cf above start)

Plug-Flow detention time= 119.7 min calculated for 0.290 af (80% of inflow)
 Center-of-Mass det. time= 3.2 min (813.5 - 810.3)

Volume	Invert	Avail.Storage	Storage Description
#1	326.00'	13,093 cf	Forebay Storage (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
326.00	513	516.0	0	0	513
327.00	1,557	529.0	988	988	1,714
328.00	2,628	541.0	2,069	3,057	2,867
329.00	5,198	591.0	3,841	6,898	7,407
330.00	7,249	696.0	6,195	13,093	18,180

3,057/16,296 = 19% WQv IN FOREBAY

Device	Routing	Invert	Outlet Devices
#1	Primary	328.00'	20.0' long x 18.0' breadth Stone Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=7.47 cfs @ 11.98 hrs HW=328.27' (Free Discharge)

←1=Stone Spillway (Weir Controls 7.47 cfs @ 1.39 fps)

Summary for Pond 2P: Gravel Wetland

[42] Hint: Gap in defined storage above volume #1 at 326.08'

[81] Warning: Exceeded Pond 2F by 0.02' @ 20.12 hrs

Inflow Area = 6.850 ac, 0.00% Impervious, Inflow Depth = 0.63" for WQv event
 Inflow = 7.49 cfs @ 11.98 hrs, Volume= 0.360 af
 Outflow = 0.08 cfs @ 19.95 hrs, Volume= 0.360 af, Atten= 99%, Lag= 478.0 min
Primary = 0.08 cfs @ 19.95 hrs, Volume= 0.360 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Starting Elev= 326.42' Surf.Area= 8,003 sf Storage= 6,634 cf
 Peak Elev= 328.03' @ 19.95 hrs Surf.Area= 17,852 sf Storage= 18,270 cf (11,636 cf above start)

Plug-Flow detention time= 2,451.3 min calculated for 0.207 af (58% of inflow)

Center-of-Mass det. time= 1,544.7 min (2,358.2 - 813.5)

1,545/1,440 = 107% OF 24-HR EXTENDED DETENTION PROVIDED

Volume	Invert	Avail.Storage	Storage Description
#1	323.83'	6,634 cf	2.25' Stone Storage (Irregular) Listed below (Recalc) 16,585 cf Overall x 40.0% Voids
#2	326.75'	33,290 cf	Surface Storage (Irregular) Listed below (Recalc)
		39,924 cf	Total Available Storage 6,634/16,296 = 41% WQv IN STONE VOIDS

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
323.83	6,757	545.0	0	0	6,757
326.08	8,003	573.0	16,585	16,585	9,548

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
326.75	8,380	568.0	0	0	8,380
327.00	8,664	571.0	2,130	2,130	8,687
328.00	9,820	584.0	9,236	11,366	10,014
329.00	10,914	602.0	10,362	21,729	11,813
330.00	12,221	612.0	11,561	33,290	12,954

Device	Routing	Invert	Outlet Devices
#1	Primary	326.42'	18.0" Round 18" Outlet Pipe L= 11.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 326.42' / 326.25' S= 0.0155 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	326.42'	1.6" Vert. 1.6" Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	328.05'	12.0" W x 6.0" H Vert. Two 12"(W)x6"(H) Orifice X 2.00 C= 0.600 Limited to weir flow at low heads
#4	Secondary	328.05'	20.0' long x 10.0' breadth Stone Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.08 cfs @ 19.95 hrs HW=328.03' (Free Discharge)

↑ **1=18" Outlet Pipe** (Passes 0.08 cfs of 7.18 cfs potential flow)

↑ **2=1.6" Orifice** (Orifice Controls 0.08 cfs @ 5.98 fps)

↑ **3=Two 12"(W)x6"(H) Orifice** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=326.42' (Free Discharge)

↑ **4=Stone Spillway** (Controls 0.00 cfs)

Summary for Pond 3P: (2) 10'x6' Filterra Units (FTIBC1006)

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 0.71" for WQv event
 Inflow = 0.64 cfs @ 11.92 hrs, Volume= 0.027 af
 Outflow = 0.39 cfs @ 11.83 hrs, Volume= 0.027 af, Atten= 40%, Lag= 0.0 min
Primary = 0.39 cfs @ 11.83 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 328.83' @ 11.97 hrs Surf.Area= 120 sf Storage= 74 cf

Plug-Flow detention time= 3.7 min calculated for 0.027 af (100% of inflow)

Center-of-Mass det. time= 0.8 min (796.0 - 795.2)

328.83' - 328.21' = 0.62' = 7.4" < 9" MAXIMUM PONDING RECOMMENDED BY 2017 VSMM

Volume	Invert	Avail.Storage	Storage Description
#1	328.21'	132 cf	6.00'W x 10.00'L x 1.10'H Vault x 2

Device	Routing	Invert	Outlet Devices
#1	Device 3	328.21'	140.000 in/hr Filtration over Surface area from 328.20' - 328.22' Excluded Surface area = 0 sf
#2	Device 3	328.96'	10.0" Horiz. 10" Overflow Pipe X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	325.71'	10.0" Round 10" PVC Pipe L= 54.0' Ke= 0.200 Inlet / Outlet Invert= 325.71' / 324.98' S= 0.0135 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=0.39 cfs @ 11.83 hrs HW=328.22' (Free Discharge)

↑ **3=10" PVC Pipe** (Passes 0.39 cfs of 4.31 cfs potential flow)

↑ **1=Filtration** (Exfiltration Controls 0.39 cfs)

↑ **2=10" Overflow Pipe** (Controls 0.00 cfs)

Summary for Pond 4P: Pipe Storage

[79] Warning: Submerged Pond 3P Primary device # 3 INLET by 0.60'

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 0.70" for WQv event
 Inflow = 0.39 cfs @ 11.83 hrs, Volume= 0.027 af
 Outflow = 0.03 cfs @ 12.99 hrs, Volume= 0.027 af, Atten= 93%, Lag= 69.4 min
Primary = 0.03 cfs @ 12.99 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

19054-HCII

Type II 24-hr WQv Rainfall=1.00"

Prepared by VHB

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Peak Elev= 326.31' @ 12.99 hrs Surf.Area= 0.019 ac Storage= 0.014 af

Plug-Flow detention time= 256.6 min calculated for 0.027 af (100% of inflow)
Center-of-Mass det. time= 256.7 min (1,052.7 - 796.0)

Volume	Invert	Avail.Storage	Storage Description
#1	325.25'	0.066 af	48.0" Round 48" Pipe L= 230.0'

Device	Routing	Invert	Outlet Devices
#1	Device 3	325.25'	1.0" Vert. 1" Orifice C= 0.600 Limited to weir flow at low heads
#2	Device 3	328.95'	5.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#3	Primary	325.25'	15.0" Round 15" Outlet Pipe L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 325.25' / 324.98' S= 0.0054 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.03 cfs @ 12.99 hrs HW=326.31' (Free Discharge)

3=15" Outlet Pipe (Passes 0.03 cfs of 3.07 cfs potential flow)

1=1" Orifice (Orifice Controls 0.03 cfs @ 4.86 fps)

2=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Summary for Pond 5F: Forebay #2

Inflow Area = 0.140 ac, 0.00% Impervious, Inflow Depth = 0.36" for WQv event
Inflow = 0.11 cfs @ 11.91 hrs, Volume= 0.004 af
Outflow = 0.10 cfs @ 11.92 hrs, Volume= 0.004 af, Atten= 5%, Lag= 0.7 min
Primary = 0.10 cfs @ 11.92 hrs, Volume= 0.004 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Starting Elev= 328.50' Surf.Area= 295 sf Storage= 306 cf

Peak Elev= 328.53' @ 11.92 hrs Surf.Area= 300 sf Storage= 314 cf (8 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 1.3 min (848.7 - 847.3)

181/187 = 97% WQv IN FOREBAY

Volume	Invert	Avail.Storage	Storage Description
#1	326.50'	478 cf	Forebay Storage (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
326.50	43	46.0	0	0	43
327.00	93	53.0	33	33	103
328.00	210	65.0	148	181	231
329.00	395	87.0	298	478	507

Device	Routing	Invert	Outlet Devices
#1	Primary	328.50'	10.0' long x 5.0' breadth Stone Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65

2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.10 cfs @ 11.92 hrs HW=328.53' (Free Discharge)

↑1=Stone Spillway (Weir Controls 0.10 cfs @ 0.38 fps)

Summary for Pond 5P: Bioretention Basin

Inflow Area = 0.140 ac, 0.00% Impervious, Inflow Depth = 0.36" for WQv event
 Inflow = 0.10 cfs @ 11.92 hrs, Volume= 0.004 af
 Outflow = 0.00 cfs @ 11.61 hrs, Volume= 0.004 af, Atten= 98%, Lag= 0.0 min
 Primary = 0.00 cfs @ 11.61 hrs, Volume= 0.004 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 328.39' @ 15.99 hrs Surf.Area= 378 sf Storage= 105 cf

Plug-Flow detention time= 545.0 min calculated for 0.004 af (100% of inflow)

Center-of-Mass det. time= 545.0 min (1,393.6 - 848.7)

328.39' - 328.00' = 0.39' = 4.7" < 9" MAXIMUM PONDING RECOMMENDED BY 2017 VSMM

Volume	Invert	Avail.Storage	Storage Description
#1	328.00'	978 cf	Surface Ponding (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
328.00	180	72.0	0	0	180
329.00	844	160.0	471	471	1,809
329.50	1,195	183.0	507	978	2,442

Device	Routing	Invert	Outlet Devices
#1	Device 4	328.00'	0.500 in/hr Filtration over Surface area from 327.99' - 328.01' Excluded Surface area = 0 sf
#2	Device 4	328.90'	1.0" Vert. 1" Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 4	329.25'	6.0" Horiz. 6" Cast-iron dome inlet grate C= 0.600 Limited to weir flow at low heads
#4	Primary	324.75'	12.0" Round Pipe Outlet L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.75' / 324.50' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 11.61 hrs HW=328.02' (Free Discharge)

↑4=Pipe Outlet (Passes 0.00 cfs of 6.02 cfs potential flow)

↑1=Filtration (Exfiltration Controls 0.00 cfs)

↑2=1" Orifice (Controls 0.00 cfs)

↑3=6" Cast-iron dome inlet grate (Controls 0.00 cfs)

Summary for Link 1L: S/N 001

Inflow Area = 7.490 ac, 0.00% Impervious, Inflow Depth = 0.61" for WQv event
 Inflow = 0.54 cfs @ 11.92 hrs, Volume= 0.379 af
 Primary = 0.54 cfs @ 11.92 hrs, Volume= 0.379 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Summary for Link 2L: S/N 002

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 0.70" for WQv event
Inflow = 0.03 cfs @ 12.99 hrs, Volume= 0.027 af
Primary = 0.03 cfs @ 12.99 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Summary for Link 3L: S/N 003

Inflow Area = 0.140 ac, 0.00% Impervious, Inflow Depth = 0.36" for WQv event
Inflow = 0.00 cfs @ 11.61 hrs, Volume= 0.004 af
Primary = 0.00 cfs @ 11.61 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

19054-HCII**Type II 24-hr 1 year Rainfall=1.99"**

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Time span=0.00-120.00 hrs, dt=0.01 hrs, 12001 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment6S: DA-1 Runoff Area=0.640 ac 0.00% Impervious Runoff Depth=0.96"
 Flow Length=160' Slope=0.0833 '/' Tc=1.9 min CN=88 Runoff=1.27 cfs 0.051 af

Subcatchment7S: DA-2 Runoff Area=6.850 ac 0.00% Impervious Runoff Depth=1.39"
 Flow Length=663' Slope=0.0550 '/' Tc=5.7 min CN=94 Runoff=16.45 cfs 0.792 af

Subcatchment8S: DA-3 Runoff Area=0.460 ac 0.00% Impervious Runoff Depth=1.39"
 Flow Length=131' Slope=0.0450 '/' Tc=1.7 min CN=94 Runoff=1.26 cfs 0.053 af

Subcatchment10S: DA-4 Runoff Area=0.140 ac 0.00% Impervious Runoff Depth=0.96"
 Flow Length=64' Slope=0.1500 '/' Tc=0.7 min CN=88 Runoff=0.29 cfs 0.011 af

Pond 7F: Forebay #1 Peak Elev=328.44' Storage=4,451 cf Inflow=16.45 cfs 0.792 af
 Outflow=16.03 cfs 0.792 af

Pond 7P: Gravel Wetland Peak Elev=328.34' Storage=21,416 cf Inflow=16.03 cfs 0.792 af
 Primary=1.10 cfs 0.426 af Secondary=7.95 cfs 0.366 af Outflow=9.06 cfs 0.792 af

Pond 8P: (2) 10'x6' Filterra Units (FTIBC1006) Peak Elev=329.10' Storage=106 cf Inflow=1.26 cfs 0.053 af
 Outflow=1.25 cfs 0.053 af

Pond 9P: Pipe Storage Peak Elev=327.14' Storage=0.031 af Inflow=1.25 cfs 0.053 af
 Outflow=0.04 cfs 0.053 af

Pond 10F: Forebay #2 Peak Elev=328.55' Storage=317 cf Inflow=0.29 cfs 0.011 af
 Outflow=0.28 cfs 0.011 af

Pond 10P: Bioretention Basin Peak Elev=328.88' Storage=379 cf Inflow=0.28 cfs 0.011 af
 Outflow=0.00 cfs 0.011 af

Link 6L: S/N 001 Inflow=9.23 cfs 0.843 af
 Primary=9.23 cfs 0.843 af

Link 7L: S/N 002 Inflow=0.04 cfs 0.053 af
 Primary=0.04 cfs 0.053 af

Link 8L: S/N 003 Inflow=0.00 cfs 0.011 af
 Primary=0.00 cfs 0.011 af

Total Runoff Area = 8.090 ac Runoff Volume = 0.907 af Average Runoff Depth = 1.35"
100.00% Pervious = 8.090 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 6S: DA-1

Runoff = 1.27 cfs @ 11.92 hrs, Volume= 0.051 af, Depth= 0.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Type II 24-hr 1 year Rainfall=1.99"

Area (ac)	CN	Description
* 0.640	88	Modified CN
0.640	88	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	160	0.0833	1.38		Lag/CN Method, LAG

Summary for Subcatchment 7S: DA-2

Runoff = 16.45 cfs @ 11.97 hrs, Volume= 0.792 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Type II 24-hr 1 year Rainfall=1.99"

Area (ac)	CN	Description
* 6.850	94	Modified CN
6.850	94	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	663	0.0550	1.93		Lag/CN Method, LAG

Summary for Subcatchment 8S: DA-3

Runoff = 1.26 cfs @ 11.92 hrs, Volume= 0.053 af, Depth= 1.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Type II 24-hr 1 year Rainfall=1.99"

Area (ac)	CN	Description
* 0.460	94	Modified CN
0.460	94	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	131	0.0450	1.26		Lag/CN Method, LAG

Summary for Subcatchment 10S: DA-4

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.29 cfs @ 11.91 hrs, Volume= 0.011 af, Depth= 0.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 year Rainfall=1.99"

Area (ac)	CN	Description
* 0.140	88	Modified CN
0.140	88	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	64	0.1500	1.54		Lag/CN Method, LAG

Summary for Pond 7F: Forebay #1

Inflow Area = 6.850 ac, 0.00% Impervious, Inflow Depth = 1.39" for 1 year event
 Inflow = 16.45 cfs @ 11.97 hrs, Volume= 0.792 af
 Outflow = 16.03 cfs @ 11.98 hrs, Volume= 0.792 af, Atten= 3%, Lag= 1.0 min
 Primary = 16.03 cfs @ 11.98 hrs, Volume= 0.792 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Starting Elev= 328.00' Surf.Area= 2,628 sf Storage= 3,057 cf
 Peak Elev= 328.44' @ 11.98 hrs Surf.Area= 3,664 sf Storage= 4,451 cf (1,393 cf above start)

Plug-Flow detention time= 70.6 min calculated for 0.721 af (91% of inflow)
 Center-of-Mass det. time= 2.8 min (803.3 - 800.5)

Volume	Invert	Avail.Storage	Storage Description
#1	326.00'	13,093 cf	Forebay Storage (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
326.00	513	516.0	0	0	513
327.00	1,557	529.0	988	988	1,714
328.00	2,628	541.0	2,069	3,057	2,867
329.00	5,198	591.0	3,841	6,898	7,407
330.00	7,249	696.0	6,195	13,093	18,180

Device	Routing	Invert	Outlet Devices
#1	Primary	328.00'	20.0' long x 18.0' breadth Stone Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=16.00 cfs @ 11.98 hrs HW=328.44' (Free Discharge)

↑1=Stone Spillway (Weir Controls 16.00 cfs @ 1.80 fps)

Summary for Pond 7P: Gravel Wetland

[42] Hint: Gap in defined storage above volume #1 at 326.08'

[81] Warning: Exceeded Pond 7F by 0.12' @ 12.14 hrs

Inflow Area = 6.850 ac, 0.00% Impervious, Inflow Depth = 1.39" for 1 year event
 Inflow = 16.03 cfs @ 11.98 hrs, Volume= 0.792 af
Outflow = 9.06 cfs @ 12.07 hrs, Volume= 0.792 af, Atten= 44%, Lag= 5.1 min
Primary = 1.10 cfs @ 12.07 hrs, Volume= 0.426 af
Secondary = 7.95 cfs @ 12.07 hrs, Volume= 0.366 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Starting Elev= 326.42' Surf.Area= 8,003 sf Storage= 6,634 cf

Peak Elev= 328.34' @ 12.07 hrs Surf.Area= 18,190 sf Storage= 21,416 cf (14,782 cf above start)

Plug-Flow detention time= 1,043.2 min calculated for 0.639 af (81% of inflow)

Center-of-Mass det. time= 759.1 min (1,562.4 - 803.3)

759/720 = 105% OF 12-HR EXTENDED
 DETENTION PROVIDED, NOT REQUIRED DUE
 TO LEPLATTE DRAINAGE AREA WAIVER

Volume	Invert	Avail.Storage	Storage Description
#1	323.83'	6,634 cf	2.25' Stone Storage (Irregular) Listed below (Recalc) 16,585 cf Overall x 40.0% Voids
#2	326.75'	33,290 cf	Surface Storage (Irregular) Listed below (Recalc)
		39,924 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
323.83	6,757	545.0	0	0	6,757
326.08	8,003	573.0	16,585	16,585	9,548

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
326.75	8,380	568.0	0	0	8,380
327.00	8,664	571.0	2,130	2,130	8,687
328.00	9,820	584.0	9,236	11,366	10,014
329.00	10,914	602.0	10,362	21,729	11,813
330.00	12,221	612.0	11,561	33,290	12,954

Device	Routing	Invert	Outlet Devices
#1	Primary	326.42'	18.0" Round 18" Outlet Pipe L= 11.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 326.42' / 326.25' S= 0.0155 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	326.42'	1.6" Vert. 1.6" Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	328.05'	12.0" W x 6.0" H Vert. Two 12"(W)x6"(H) Orifice X 2.00 C= 0.600 Limited to weir flow at low heads
#4	Secondary	328.05'	20.0' long x 10.0' breadth Stone Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=1.10 cfs @ 12.07 hrs HW=328.34' (Free Discharge)

↑ **1=18" Outlet Pipe** (Passes 1.10 cfs of 8.73 cfs potential flow)

↑ **2=1.6" Orifice** (Orifice Controls 0.09 cfs @ 6.56 fps)

↑ **3=Two 12"(W)x6"(H) Orifice** (Orifice Controls 1.01 cfs @ 1.73 fps)

Secondary OutFlow Max=7.92 cfs @ 12.07 hrs HW=328.34' (Free Discharge)

↑ **4=Stone Spillway** (Weir Controls 7.92 cfs @ 1.36 fps)

Summary for Pond 8P: (2) 10'x6' Filterra Units (FTIBC1006)

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 1.39" for 1 year event
 Inflow = 1.26 cfs @ 11.92 hrs, Volume= 0.053 af
Outflow = 1.25 cfs @ 11.92 hrs, Volume= 0.053 af, Atten= 1%, Lag= 0.2 min
Primary = 1.25 cfs @ 11.92 hrs, Volume= 0.053 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 329.10' @ 11.92 hrs Surf.Area= 120 sf Storage= 106 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 0.6 min (797.4 - 796.8)

Volume	Invert	Avail.Storage	Storage Description
#1	328.21'	132 cf	6.00'W x 10.00'L x 1.10'H Vault x 2

Device	Routing	Invert	Outlet Devices
#1	Device 3	328.21'	140.000 in/hr Filtration over Surface area from 328.20' - 328.22' Excluded Surface area = 0 sf
#2	Device 3	328.96'	10.0" Horiz. 10" Overflow Pipe X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	325.71'	10.0" Round 10" PVC Pipe L= 54.0' Ke= 0.200 Inlet / Outlet Invert= 325.71' / 324.98' S= 0.0135 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=1.25 cfs @ 11.92 hrs HW=329.10' (Free Discharge)

↑ **3=10" PVC Pipe** (Passes 1.25 cfs of 5.04 cfs potential flow)

↑ **1=Filtration** (Exfiltration Controls 0.39 cfs)

↑ **2=10" Overflow Pipe** (Weir Controls 0.86 cfs @ 1.21 fps)

Summary for Pond 9P: Pipe Storage

[79] Warning: Submerged Pond 8P Primary device # 3 INLET by 1.43'

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 1.39" for 1 year event
 Inflow = 1.25 cfs @ 11.92 hrs, Volume= 0.053 af
Outflow = 0.04 cfs @ 13.75 hrs, Volume= 0.053 af, Atten= 97%, Lag= 109.6 min
Primary = 0.04 cfs @ 13.75 hrs, Volume= 0.053 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

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Peak Elev= 327.14' @ 13.75 hrs Surf.Area= 0.021 ac Storage= 0.031 af

Plug-Flow detention time= 435.9 min calculated for 0.053 af (100% of inflow)

Center-of-Mass det. time= 436.0 min (1,233.4 - 797.4)

436/720 = 61% OF 12-HR EXTENDED DETENTION PROVIDED, 1" MINIMUM ORIFICE SIZE USED

Volume	Invert	Avail.Storage	Storage Description
#1	325.25'	0.066 af	48.0" Round 48" Pipe L= 230.0'

Device	Routing	Invert	Outlet Devices
#1	Device 3	325.25'	1.0" Vert. 1" Orifice C= 0.600 Limited to weir flow at low heads
#2	Device 3	328.95'	5.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#3	Primary	325.25'	15.0" Round 15" Outlet Pipe L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 325.25' / 324.98' S= 0.0054 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.04 cfs @ 13.75 hrs HW=327.14' (Free Discharge)

3=15" Outlet Pipe (Passes 0.04 cfs of 5.75 cfs potential flow)

1=1" Orifice (Orifice Controls 0.04 cfs @ 6.55 fps)

2=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Summary for Pond 10F: Forebay #2

Inflow Area = 0.140 ac, 0.00% Impervious, Inflow Depth = 0.96" for 1 year event

Inflow = 0.29 cfs @ 11.91 hrs, Volume= 0.011 af

Outflow = 0.28 cfs @ 11.92 hrs, Volume= 0.011 af, Atten= 3%, Lag= 0.5 min

Primary = 0.28 cfs @ 11.92 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Starting Elev= 328.50' Surf.Area= 278 sf Storage= 302 cf

Peak Elev= 328.55' @ 11.92 hrs Surf.Area= 289 sf Storage= 317 cf (15 cf above start)

Plug-Flow detention time= 317.9 min calculated for 0.004 af (38% of inflow)

Center-of-Mass det. time= 1.2 min (829.2 - 828.1)

Volume	Invert	Avail.Storage	Storage Description
#1	326.50'	470 cf	Forebay Storage (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
326.50	43	46.0	0	0	43
327.00	93	53.0	33	33	103
328.00	210	65.0	148	181	231
328.50	278	71.0	122	302	304
329.00	395	87.0	167	470	509

Device	Routing	Invert	Outlet Devices
#1	Primary	328.50'	10.0' long x 5.0' breadth Stone Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.28 cfs @ 11.92 hrs HW=328.55' (Free Discharge)

↑1=Stone Spillway (Weir Controls 0.28 cfs @ 0.53 fps)

Summary for Pond 10P: Bioretention Basin

[81] Warning: Exceeded Pond 10F by 0.38' @ 24.04 hrs

Inflow Area = 0.140 ac, 0.00% Impervious, Inflow Depth = 0.96" for 1 year event
 Inflow = 0.28 cfs @ 11.92 hrs, Volume= 0.011 af
 Outflow = 0.00 cfs @ 10.70 hrs, Volume= 0.011 af, Atten= 99%, Lag= 0.0 min
 Primary = 0.00 cfs @ 10.70 hrs, Volume= 0.011 af

1,675/720 = 233% OF 12-HR
 EXTENDED DETENTION PROVIDED,
 ALL OF CPv FILTERING THRU MEDIA

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Peak Elev= 328.88' @ 24.01 hrs Surf.Area= 742 sf Storage= 379 cf

Plug-Flow detention time= 1,674.9 min calculated for 0.011 af (100% of inflow)

Center-of-Mass det. time= 1,675.0 min (2,504.3 - 829.2)

Volume	Invert	Avail.Storage	Storage Description		
#1	328.00'	978 cf	Surface Ponding (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
328.00	180	72.0	0	0	180
329.00	844	160.0	471	471	1,809
329.50	1,195	183.0	507	978	2,442

Device	Routing	Invert	Outlet Devices
#1	Device 4	328.00'	0.500 in/hr Filtration over Surface area from 327.99' - 328.01' Excluded Surface area = 0 sf
#2	Device 4	328.90'	1.0" Vert. 1" Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 4	329.25'	6.0" Horiz. 6" Cast-iron dome inlet grate C= 0.600 Limited to weir flow at low heads
#4	Primary	324.75'	12.0" Round Pipe Outlet L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.75' / 324.50' S= 0.0063 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 10.70 hrs HW=328.02' (Free Discharge)

↑4=Pipe Outlet (Passes 0.00 cfs of 6.02 cfs potential flow)

↑1=Filtration (Exfiltration Controls 0.00 cfs)

↑2=1" Orifice (Controls 0.00 cfs)

↑3=6" Cast-iron dome inlet grate (Controls 0.00 cfs)

Summary for Link 6L: S/N 001

Inflow Area = 7.490 ac, 0.00% Impervious, Inflow Depth = 1.35" for 1 year event
Inflow = 9.23 cfs @ 12.07 hrs, Volume= 0.843 af
Primary = 9.23 cfs @ 12.07 hrs, Volume= 0.843 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Summary for Link 7L: S/N 002

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 1.39" for 1 year event
Inflow = 0.04 cfs @ 13.75 hrs, Volume= 0.053 af
Primary = 0.04 cfs @ 13.75 hrs, Volume= 0.053 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Summary for Link 8L: S/N 003

Inflow Area = 0.140 ac, 0.00% Impervious, Inflow Depth = 0.96" for 1 year event
Inflow = 0.00 cfs @ 10.70 hrs, Volume= 0.011 af
Primary = 0.00 cfs @ 10.70 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

19054-HCII**Type II 24-hr 10 year Rainfall=3.40"**

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Time span=0.00-120.00 hrs, dt=0.01 hrs, 12001 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 11S: DA-1 Runoff Area=0.640 ac 0.00% Impervious Runoff Depth=2.09"
 Flow Length=160' Slope=0.0833 '/' Tc=2.0 min CN=87 Runoff=2.69 cfs 0.112 af

Subcatchment 12S: DA-2 Runoff Area=6.850 ac 0.00% Impervious Runoff Depth=2.64"
 Flow Length=663' Slope=0.0550 '/' Tc=6.0 min CN=93 Runoff=30.07 cfs 1.506 af

Subcatchment 13S: DA-3 Runoff Area=0.460 ac 0.00% Impervious Runoff Depth=2.64"
 Flow Length=131' Slope=0.0450 '/' Tc=1.8 min CN=93 Runoff=2.31 cfs 0.101 af

Subcatchment 15S: DA-4 Runoff Area=0.140 ac 0.00% Impervious Runoff Depth=2.09"
 Flow Length=64' Slope=0.1500 '/' Tc=0.7 min CN=87 Runoff=0.61 cfs 0.024 af

Pond 12F: Forebay #1 Peak Elev=328.67' Storage=5,339 cf Inflow=30.07 cfs 1.506 af
 Outflow=29.37 cfs 1.506 af

Pond 12P: Gravel Wetland Peak Elev=328.64' Storage=24,466 cf Inflow=29.37 cfs 1.506 af
 Primary=2.82 cfs 0.514 af Secondary=24.17 cfs 0.992 af Outflow=26.98 cfs 1.506 af

Pond 13P: (2) 10'x6' Filterra Units (FTIBC1006) Peak Elev=329.19' Storage=118 cf Inflow=2.31 cfs 0.101 af
 Outflow=2.30 cfs 0.101 af

Pond 14P: Pipe Storage Peak Elev=328.90' Storage=0.064 af Inflow=2.30 cfs 0.101 af
 Outflow=0.05 cfs 0.101 af

Pond 15F: Forebay #2 Peak Elev=328.59' Storage=327 cf Inflow=0.61 cfs 0.024 af
 Outflow=0.60 cfs 0.024 af

Pond 15P: Bioretention Basin Peak Elev=329.20' Storage=651 cf Inflow=0.60 cfs 0.024 af
 Outflow=0.02 cfs 0.024 af

Link 11L: S/N 001 Inflow=27.79 cfs 1.618 af
 Primary=27.79 cfs 1.618 af

Link 12L: S/N 002 Inflow=0.05 cfs 0.101 af
 Primary=0.05 cfs 0.101 af

Link 13L: S/N 003 Inflow=0.02 cfs 0.024 af
 Primary=0.02 cfs 0.024 af

Total Runoff Area = 8.090 ac Runoff Volume = 1.743 af Average Runoff Depth = 2.59"
100.00% Pervious = 8.090 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 11S: DA-1

Runoff = 2.69 cfs @ 11.92 hrs, Volume= 0.112 af, Depth= 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Type II 24-hr 10 year Rainfall=3.40"

Area (ac)	CN	Description
* 0.640	87	Modified CN
0.640	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	160	0.0833	1.33		Lag/CN Method, LAG

Summary for Subcatchment 12S: DA-2

Runoff = 30.07 cfs @ 11.97 hrs, Volume= 1.506 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Type II 24-hr 10 year Rainfall=3.40"

Area (ac)	CN	Description
* 6.850	93	Modified CN
6.850	93	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	663	0.0550	1.84		Lag/CN Method, LAG

Summary for Subcatchment 13S: DA-3

Runoff = 2.31 cfs @ 11.92 hrs, Volume= 0.101 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Type II 24-hr 10 year Rainfall=3.40"

Area (ac)	CN	Description
* 0.460	93	Modified CN
0.460	93	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	131	0.0450	1.20		Lag/CN Method, LAG

Summary for Subcatchment 15S: DA-4

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.61 cfs @ 11.91 hrs, Volume= 0.024 af, Depth= 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 year Rainfall=3.40"

Area (ac)	CN	Description
* 0.140	87	Modified CN
0.140	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	64	0.1500	1.49		Lag/CN Method, LAG

Summary for Pond 12F: Forebay #1

Inflow Area = 6.850 ac, 0.00% Impervious, Inflow Depth = 2.64" for 10 year event

Inflow = 30.07 cfs @ 11.97 hrs, Volume= 1.506 af

Outflow = 29.37 cfs @ 11.99 hrs, Volume= 1.506 af, Atten= 2%, Lag= 1.0 min

Primary = 29.37 cfs @ 11.99 hrs, Volume= 1.506 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Starting Elev= 328.00' Surf.Area= 2,628 sf Storage= 3,057 cf

Peak Elev= 328.67' @ 11.99 hrs Surf.Area= 4,253 sf Storage= 5,339 cf (2,282 cf above start)

Plug-Flow detention time= 45.8 min calculated for 1.436 af (95% of inflow)

Center-of-Mass det. time= 2.5 min (789.9 - 787.4)

Volume	Invert	Avail.Storage	Storage Description
#1	326.00'	13,093 cf	Forebay Storage (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
326.00	513	516.0	0	0	513
327.00	1,557	529.0	988	988	1,714
328.00	2,628	541.0	2,069	3,057	2,867
329.00	5,198	591.0	3,841	6,898	7,407
330.00	7,249	696.0	6,195	13,093	18,180

Device	Routing	Invert	Outlet Devices
#1	Primary	328.00'	20.0' long x 18.0' breadth Stone Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=29.30 cfs @ 11.99 hrs HW=328.67' (Free Discharge)

←1=Stone Spillway (Weir Controls 29.30 cfs @ 2.19 fps)

Summary for Pond 12P: Gravel Wetland

[42] Hint: Gap in defined storage above volume #1 at 326.08'

[81] Warning: Exceeded Pond 12F by 0.16' @ 12.12 hrs

Inflow Area = 6.850 ac, 0.00% Impervious, Inflow Depth = 2.64" for 10 year event
 Inflow = 29.37 cfs @ 11.99 hrs, Volume= 1.506 af
Outflow = 26.98 cfs @ 12.02 hrs, Volume= 1.506 af, Atten= 8%, Lag= 2.0 min
Primary = 2.82 cfs @ 12.02 hrs, Volume= 0.514 af
Secondary = 24.17 cfs @ 12.02 hrs, Volume= 0.992 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Starting Elev= 326.42' Surf.Area= 8,003 sf Storage= 6,634 cf

Peak Elev= 328.64' @ 12.02 hrs Surf.Area= 18,512 sf Storage= 24,466 cf (17,832 cf above start)

Plug-Flow detention time= 525.6 min calculated for 1.354 af (90% of inflow)

Center-of-Mass det. time= 414.5 min (1,204.4 - 789.9)

Volume	Invert	Avail.Storage	Storage Description
#1	323.83'	6,634 cf	2.25' Stone Storage (Irregular) Listed below (Recalc) 16,585 cf Overall x 40.0% Voids
#2	326.75'	33,290 cf	Surface Storage (Irregular) Listed below (Recalc)
		39,924 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
323.83	6,757	545.0	0	0	6,757
326.08	8,003	573.0	16,585	16,585	9,548

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
326.75	8,380	568.0	0	0	8,380
327.00	8,664	571.0	2,130	2,130	8,687
328.00	9,820	584.0	9,236	11,366	10,014
329.00	10,914	602.0	10,362	21,729	11,813
330.00	12,221	612.0	11,561	33,290	12,954

Device	Routing	Invert	Outlet Devices
#1	Primary	326.42'	18.0" Round 18" Outlet Pipe L= 11.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 326.42' / 326.25' S= 0.0155 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	326.42'	1.6" Vert. 1.6" Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	328.05'	12.0" W x 6.0" H Vert. Two 12"(W)x6"(H) Orifice X 2.00 C= 0.600 Limited to weir flow at low heads
#4	Secondary	328.05'	20.0' long x 10.0' breadth Stone Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=2.82 cfs @ 12.02 hrs HW=328.64' (Free Discharge)

↑1=18" Outlet Pipe (Passes 2.82 cfs of 10.23 cfs potential flow)

↑2=1.6" Orifice (Orifice Controls 0.10 cfs @ 7.06 fps)

↑3=Two 12"(W)x6"(H) Orifice (Orifice Controls 2.72 cfs @ 2.72 fps)

Secondary OutFlow Max=24.12 cfs @ 12.02 hrs HW=328.64' (Free Discharge)

↑4=Stone Spillway (Weir Controls 24.12 cfs @ 2.06 fps)

Summary for Pond 13P: (2) 10'x6' Filterra Units (FTIBC1006)

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 2.64" for 10 year event

Inflow = 2.31 cfs @ 11.92 hrs, Volume= 0.101 af

Outflow = 2.30 cfs @ 11.92 hrs, Volume= 0.101 af, Atten= 1%, Lag= 0.1 min

Primary = 2.30 cfs @ 11.92 hrs, Volume= 0.101 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 329.19' @ 11.92 hrs Surf.Area= 120 sf Storage= 118 cf

Plug-Flow detention time= 1.1 min calculated for 0.101 af (100% of inflow)

Center-of-Mass det. time= 0.7 min (784.2 - 783.5)

Volume	Invert	Avail.Storage	Storage Description
#1	328.21'	132 cf	6.00'W x 10.00'L x 1.10'H Vault x 2

Device	Routing	Invert	Outlet Devices
#1	Device 3	328.21'	140.000 in/hr Filtration over Surface area from 328.20' - 328.22' Excluded Surface area = 0 sf
#2	Device 3	328.96'	10.0" Horiz. 10" Overflow Pipe X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	325.71'	10.0" Round 10" PVC Pipe L= 54.0' Ke= 0.200 Inlet / Outlet Invert= 325.71' / 324.98' S= 0.0135 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=2.29 cfs @ 11.92 hrs HW=329.19' (Free Discharge)

↑3=10" PVC Pipe (Passes 2.29 cfs of 5.11 cfs potential flow)

↑1=10" Filtration (Exfiltration Controls 0.39 cfs)

↑2=10" Overflow Pipe (Weir Controls 1.90 cfs @ 1.57 fps)

Summary for Pond 14P: Pipe Storage

[81] Warning: Exceeded Pond 13P by 0.69' @ 14.57 hrs

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 2.64" for 10 year event

Inflow = 2.30 cfs @ 11.92 hrs, Volume= 0.101 af

Outflow = 0.05 cfs @ 14.57 hrs, Volume= 0.101 af, Atten= 98%, Lag= 158.8 min

Primary = 0.05 cfs @ 14.57 hrs, Volume= 0.101 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

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Type II 24-hr 10 year Rainfall=3.40"

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Peak Elev= 328.90' @ 14.57 hrs Surf.Area= 0.012 ac Storage= 0.064 af

Plug-Flow detention time= 660.2 min calculated for 0.101 af (100% of inflow)
Center-of-Mass det. time= 660.2 min (1,444.3 - 784.2)

Volume	Invert	Avail.Storage	Storage Description
#1	325.25'	0.066 af	48.0" Round 48" Pipe L= 230.0'

Device	Routing	Invert	Outlet Devices
#1	Device 3	325.25'	1.0" Vert. 1" Orifice C= 0.600 Limited to weir flow at low heads
#2	Device 3	328.95'	5.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#3	Primary	325.25'	15.0" Round 15" Outlet Pipe L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 325.25' / 324.98' S= 0.0054 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.05 cfs @ 14.57 hrs HW=328.90' (Free Discharge)

← **3=15" Outlet Pipe** (Passes 0.05 cfs of 9.86 cfs potential flow)

← **1=1" Orifice** (Orifice Controls 0.05 cfs @ 9.15 fps)

← **2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 15F: Forebay #2

Inflow Area = 0.140 ac, 0.00% Impervious, Inflow Depth = 2.09" for 10 year event

Inflow = 0.61 cfs @ 11.91 hrs, Volume= 0.024 af

Outflow = 0.60 cfs @ 11.92 hrs, Volume= 0.024 af, Atten= 2%, Lag= 0.4 min

Primary = 0.60 cfs @ 11.92 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Starting Elev= 328.50' Surf.Area= 278 sf Storage= 302 cf

Peak Elev= 328.59' @ 11.92 hrs Surf.Area= 297 sf Storage= 327 cf (25 cf above start)

Plug-Flow detention time= 151.3 min calculated for 0.017 af (72% of inflow)

Center-of-Mass det. time= 1.1 min (809.4 - 808.3)

Volume	Invert	Avail.Storage	Storage Description
#1	326.50'	470 cf	Forebay Storage (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
326.50	43	46.0	0	0	43
327.00	93	53.0	33	33	103
328.00	210	65.0	148	181	231
328.50	278	71.0	122	302	304
329.00	395	87.0	167	470	509

Device	Routing	Invert	Outlet Devices
#1	Primary	328.50'	10.0' long x 5.0' breadth Stone Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50

Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65
 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.59 cfs @ 11.92 hrs HW=328.59' (Free Discharge)

↑1=Stone Spillway (Weir Controls 0.59 cfs @ 0.69 fps)

Summary for Pond 15P: Bioretention Basin

[81] Warning: Exceeded Pond 15F by 0.69' @ 14.06 hrs

Inflow Area = 0.140 ac, 0.00% Impervious, Inflow Depth = 2.09" for 10 year event

Inflow = 0.60 cfs @ 11.92 hrs, Volume= 0.024 af

Outflow = 0.02 cfs @ 14.01 hrs, Volume= 0.024 af, Atten= 97%, Lag= 125.8 min

Primary = 0.02 cfs @ 14.01 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 329.20' @ 14.01 hrs Surf.Area= 976 sf Storage= 651 cf

Plug-Flow detention time= 1,091.6 min calculated for 0.024 af (100% of inflow)

Center-of-Mass det. time= 1,091.6 min (1,901.0 - 809.4)

Volume	Invert	Avail.Storage	Storage Description			
#1	328.00'	978 cf	Surface Ponding (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
328.00	180	72.0	0	0	180	
329.00	844	160.0	471	471	1,809	
329.50	1,195	183.0	507	978	2,442	

Device	Routing	Invert	Outlet Devices
#1	Device 4	328.00'	0.500 in/hr Filtration over Surface area from 327.99' - 328.01' Excluded Surface area = 0 sf
#2	Device 4	328.90'	1.0" Vert. 1" Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 4	329.25'	6.0" Horiz. 6" Cast-iron dome inlet grate C= 0.600 Limited to weir flow at low heads
#4	Primary	324.75'	12.0" Round Pipe Outlet L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.75' / 324.50' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.02 cfs @ 14.01 hrs HW=329.20' (Free Discharge)

↑4=Pipe Outlet (Passes 0.02 cfs of 7.30 cfs potential flow)

↑1=Filtration (Exfiltration Controls 0.00 cfs)

↑2=1" Orifice (Orifice Controls 0.01 cfs @ 2.44 fps)

↑3=6" Cast-iron dome inlet grate (Controls 0.00 cfs)

Summary for Link 11L: S/N 001

Inflow Area = 7.490 ac, 0.00% Impervious, Inflow Depth = 2.59" for 10 year event
Inflow = 27.79 cfs @ 12.01 hrs, Volume= 1.618 af
Primary = 27.79 cfs @ 12.01 hrs, Volume= 1.618 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Summary for Link 12L: S/N 002

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 2.64" for 10 year event
Inflow = 0.05 cfs @ 14.57 hrs, Volume= 0.101 af
Primary = 0.05 cfs @ 14.57 hrs, Volume= 0.101 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Summary for Link 13L: S/N 003

Inflow Area = 0.140 ac, 0.00% Impervious, Inflow Depth = 2.09" for 10 year event
Inflow = 0.02 cfs @ 14.01 hrs, Volume= 0.024 af
Primary = 0.02 cfs @ 14.01 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

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Type II 24-hr 10 year Rainfall=3.40"

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Time span=0.00-120.00 hrs, dt=0.01 hrs, 12001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 16S: DA-3

Runoff Area=0.460 ac 0.00% Impervious Runoff Depth=2.01"

Flow Length=131' Slope=0.0200 '/' Tc=3.6 min CN=86 Runoff=1.77 cfs 0.077 af

Subcatchment 17S: DA-4

Runoff Area=0.140 ac 0.00% Impervious Runoff Depth=1.42"

Flow Length=64' Slope=0.0500 '/' Tc=1.7 min CN=78 Runoff=0.42 cfs 0.017 af

Total Runoff Area = 0.600 ac Runoff Volume = 0.094 af Average Runoff Depth = 1.87"
100.00% Pervious = 0.600 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 16S: DA-3

Runoff = 1.77 cfs @ 11.94 hrs, Volume= 0.077 af, Depth= 2.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Type II 24-hr 10 year Rainfall=3.40"

Area (ac)	CN	Description
* 0.460	86	Modified CN
0.460	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	131	0.0200	0.60		Lag/CN Method, LAG

Summary for Subcatchment 17S: DA-4

Runoff = 0.42 cfs @ 11.92 hrs, Volume= 0.017 af, Depth= 1.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Type II 24-hr 10 year Rainfall=3.40"

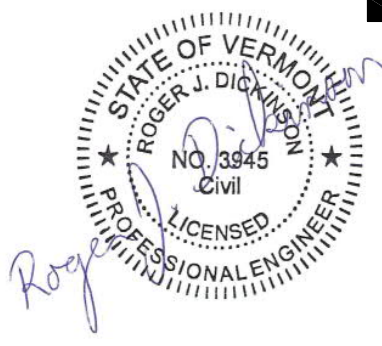
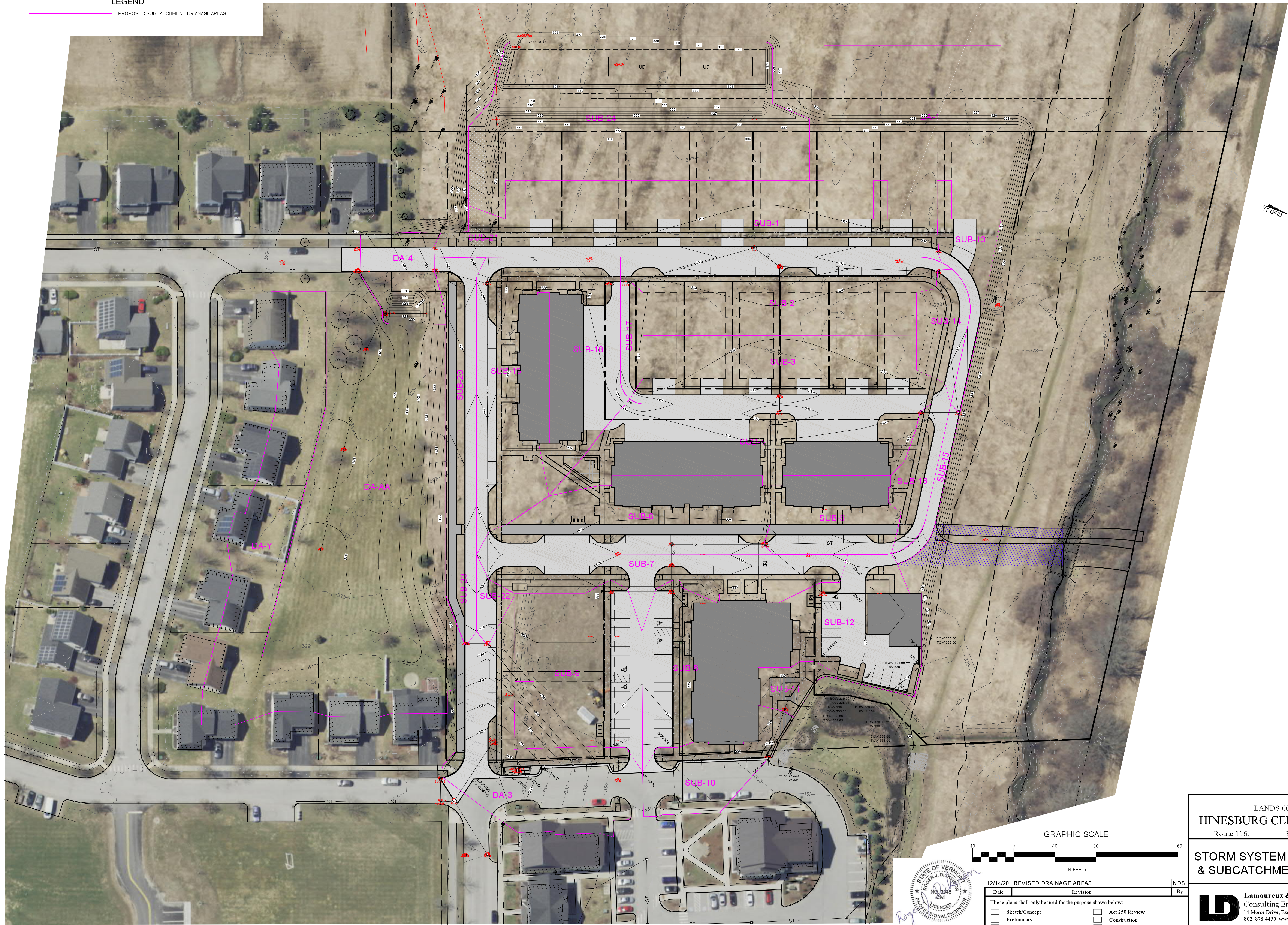
Area (ac)	CN	Description
* 0.140	78	Modified CN
0.140	78	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	64	0.0500	0.64		Lag/CN Method, LAG

APPENDIX F
STORM SYSTEM DRAINAGE
HCII - SUBCATCHMENT AREAS

LEGEND

PROPOSED SUBCATCHMENT DRAINAGE AREAS



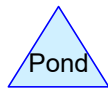
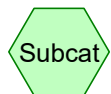
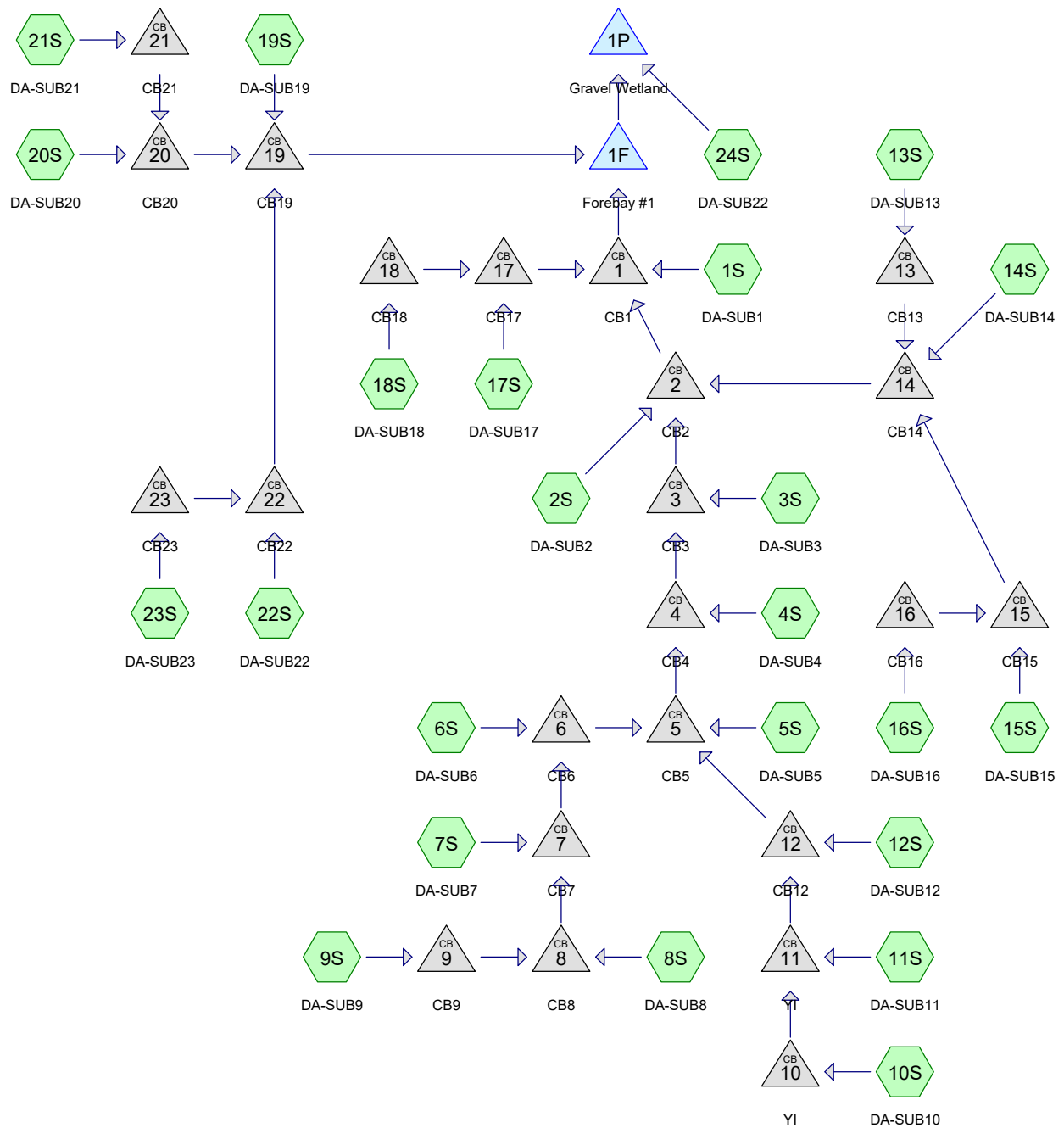
12/14/20 REVISED DRAINAGE AREAS		NDS
Date	Revision	By

These plans shall only be used for the purpose shown below:

<input type="checkbox"/> Sketch/Concept	<input type="checkbox"/> Act 250 Review
<input type="checkbox"/> Preliminary	<input type="checkbox"/> Construction
<input type="checkbox"/> Final	<input type="checkbox"/> Record Drawing

LANDS OF HINESBURG CENTER, LLC Route 116, Hinesburg, VT		Project No. 19054 Survey N/A Design - Drawn DLH Checked RJD Date 11/16/20 Scale AS NOTED Sheet number ST2
STORM SYSTEM DRAINAGE & SUBCATCHMENT AREAS		Lamoureux & Dickinson Consulting Engineers, Inc. 14 Morse Drive, Essex, VT 05452 802-878-4450 www.LDEngineering.com

APPENDIX G
STORM SYSTEM MODELLING
(HCII - Qp100)



Routing Diagram for 19054-HCII - pipe network
 Prepared by VHB, Printed 5/5/2022
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19054-HCII - pipe network**Type II 24-hr 100 year Rainfall=5.08"**

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Time span=0.00-120.00 hrs, dt=0.01 hrs, 12001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: DA-SUB1	Runoff Area=0.590 ac 67.80% Impervious Runoff Depth=4.24" Tc=3.0 min CN=WQ Runoff=4.28 cfs 0.208 af
Subcatchment2S: DA-SUB2	Runoff Area=0.500 ac 68.00% Impervious Runoff Depth=4.24" Tc=3.0 min CN=WQ Runoff=3.63 cfs 0.177 af
Subcatchment3S: DA-SUB3	Runoff Area=0.430 ac 69.77% Impervious Runoff Depth=4.27" Tc=3.0 min CN=WQ Runoff=3.14 cfs 0.153 af
Subcatchment4S: DA-SUB4	Runoff Area=0.510 ac 82.35% Impervious Runoff Depth=4.51" Tc=3.0 min CN=WQ Runoff=3.86 cfs 0.192 af
Subcatchment5S: DA-SUB5	Runoff Area=0.210 ac 76.19% Impervious Runoff Depth=4.40" Tc=3.0 min CN=WQ Runoff=1.56 cfs 0.077 af
Subcatchment6S: DA-SUB6	Runoff Area=0.410 ac 73.17% Impervious Runoff Depth=4.34" Tc=3.0 min CN=WQ Runoff=3.02 cfs 0.148 af
Subcatchment7S: DA-SUB7	Runoff Area=0.290 ac 68.97% Impervious Runoff Depth=4.26" Tc=3.0 min CN=WQ Runoff=2.11 cfs 0.103 af
Subcatchment8S: DA-SUB8	Runoff Area=0.280 ac 85.71% Impervious Runoff Depth=4.57" Tc=3.0 min CN=WQ Runoff=2.14 cfs 0.107 af
Subcatchment9S: DA-SUB9	Runoff Area=0.430 ac 90.70% Impervious Runoff Depth=4.67" Tc=3.0 min CN=WQ Runoff=3.33 cfs 0.167 af
Subcatchment10S: DA-SUB10	Runoff Area=0.180 ac 72.22% Impervious Runoff Depth=4.17" Tc=3.0 min CN=WQ Runoff=1.27 cfs 0.063 af
Subcatchment11S: DA-SUB11	Runoff Area=0.050 ac 40.00% Impervious Runoff Depth=3.71" Tc=3.0 min CN=WQ Runoff=0.33 cfs 0.015 af
Subcatchment12S: DA-SUB12	Runoff Area=0.450 ac 88.89% Impervious Runoff Depth=4.63" Tc=3.0 min CN=WQ Runoff=3.47 cfs 0.174 af
Subcatchment13S: DA-SUB13	Runoff Area=0.120 ac 50.00% Impervious Runoff Depth=3.90" Tc=3.0 min CN=WQ Runoff=0.82 cfs 0.039 af
Subcatchment14S: DA-SUB14	Runoff Area=0.110 ac 36.36% Impervious Runoff Depth=3.65" Tc=3.0 min CN=WQ Runoff=0.72 cfs 0.033 af
Subcatchment15S: DA-SUB15	Runoff Area=0.040 ac 100.00% Impervious Runoff Depth=4.84" Tc=3.0 min CN=98 Runoff=0.32 cfs 0.016 af
Subcatchment16S: DA-SUB16	Runoff Area=0.100 ac 60.00% Impervious Runoff Depth=4.09" Tc=3.0 min CN=WQ Runoff=0.71 cfs 0.034 af

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Subcatchment17S: DA-SUB17	Runoff Area=0.050 ac 40.00% Impervious Runoff Depth=3.71" Tc=3.0 min CN=WQ Runoff=0.33 cfs 0.015 af
Subcatchment18S: DA-SUB18	Runoff Area=0.320 ac 84.38% Impervious Runoff Depth=4.55" Tc=3.0 min CN=WQ Runoff=2.43 cfs 0.121 af
Subcatchment19S: DA-SUB19	Runoff Area=0.390 ac 69.23% Impervious Runoff Depth=4.26" Tc=3.0 min CN=WQ Runoff=2.84 cfs 0.139 af
Subcatchment20S: DA-SUB20	Runoff Area=0.210 ac 66.67% Impervious Runoff Depth=4.22" Tc=3.0 min CN=WQ Runoff=1.52 cfs 0.074 af
Subcatchment21S: DA-SUB21	Runoff Area=0.100 ac 70.00% Impervious Runoff Depth=4.28" Tc=3.0 min CN=WQ Runoff=0.73 cfs 0.036 af
Subcatchment22S: DA-SUB22	Runoff Area=0.040 ac 75.00% Impervious Runoff Depth=4.37" Tc=3.0 min CN=WQ Runoff=0.30 cfs 0.015 af
Subcatchment23S: DA-SUB23	Runoff Area=0.050 ac 80.00% Impervious Runoff Depth=4.47" Tc=3.0 min CN=WQ Runoff=0.38 cfs 0.019 af
Subcatchment24S: DA-SUB22	Runoff Area=0.120 ac 91.67% Impervious Runoff Depth=4.69" Tc=3.0 min CN=WQ Runoff=0.93 cfs 0.047 af
Pond 1: CB1	Peak Elev=332.40' Inflow=37.46 cfs 1.843 af 30.0" Round Culvert n=0.013 L=125.0' S=0.0040 ' /' Outflow=37.46 cfs 1.843 af
Pond 1F: Forebay#1	Peak Elev=328.86' Storage=6,185 cf Inflow=43.22 cfs 2.125 af Outflow=41.85 cfs 2.125 af
Pond 1P: Gravel Wetland	Peak Elev=328.81' Storage=26,272 cf Inflow=42.75 cfs 2.171 af Primary=3.49 cfs 0.602 af Secondary=35.45 cfs 1.570 af Outflow=38.94 cfs 2.171 af
Pond 2: CB2	Peak Elev=331.61' Inflow=30.42 cfs 1.498 af 30.0" Round Culvert n=0.013 L=30.0' S=0.0040 ' /' Outflow=30.42 cfs 1.498 af
Pond 3: CB3	Peak Elev=333.05' Inflow=24.22 cfs 1.199 af 24.0" Round Culvert n=0.013 L=126.0' S=0.0040 ' /' Outflow=24.22 cfs 1.199 af
Pond 4: CB4	Peak Elev=331.96' Inflow=21.08 cfs 1.046 af 24.0" Round Culvert n=0.013 L=16.0' S=0.0044 ' /' Outflow=21.08 cfs 1.046 af
Pond 5: CB5	Peak Elev=332.34' Inflow=17.23 cfs 0.854 af 24.0" Round Culvert n=0.013 L=129.0' S=0.0040 ' /' Outflow=17.23 cfs 0.854 af
Pond 6: CB6	Peak Elev=332.73' Inflow=10.59 cfs 0.525 af 18.0" Round Culvert n=0.013 L=91.0' S=0.0040 ' /' Outflow=10.59 cfs 0.525 af
Pond 7: CB7	Peak Elev=331.81' Inflow=7.58 cfs 0.377 af 18.0" Round Culvert n=0.013 L=20.0' S=0.0040 ' /' Outflow=7.58 cfs 0.377 af

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Pond 8: CB8	Peak Elev=331.90'	Inflow=5.47 cfs	0.274 af
	15.0" Round Culvert n=0.013 L=26.0' S=0.0038 '/'	Outflow=5.47 cfs	0.274 af
Pond 9: CB9	Peak Elev=332.08'	Inflow=3.33 cfs	0.167 af
	12.0" Round Culvert n=0.013 L=58.0' S=0.0040 '/'	Outflow=3.33 cfs	0.167 af
Pond 10: YI	Peak Elev=331.81'	Inflow=1.27 cfs	0.063 af
	8.0" Round Culvert n=0.013 L=49.0' S=0.0051 '/'	Outflow=1.27 cfs	0.063 af
Pond 11: YI	Peak Elev=331.13'	Inflow=1.61 cfs	0.078 af
	12.0" Round Culvert n=0.013 L=119.0' S=0.0040 '/'	Outflow=1.61 cfs	0.078 af
Pond 12: CB12	Peak Elev=331.57'	Inflow=5.07 cfs	0.252 af
	15.0" Round Culvert n=0.013 L=74.0' S=0.0041 '/'	Outflow=5.07 cfs	0.252 af
Pond 13: CB13	Peak Elev=329.51'	Inflow=0.82 cfs	0.039 af
	15.0" Round Culvert n=0.013 L=20.0' S=0.0040 '/'	Outflow=0.82 cfs	0.039 af
Pond 14: CB14	Peak Elev=329.73'	Inflow=2.58 cfs	0.123 af
	18.0" Round Culvert n=0.013 L=155.0' S=0.0041 '/'	Outflow=2.58 cfs	0.123 af
Pond 15: CB15	Peak Elev=330.04'	Inflow=1.03 cfs	0.050 af
	15.0" Round Culvert n=0.013 L=138.0' S=0.0041 '/'	Outflow=1.03 cfs	0.050 af
Pond 16: CB16	Peak Elev=330.15'	Inflow=0.71 cfs	0.034 af
	15.0" Round Culvert n=0.013 L=36.0' S=0.0042 '/'	Outflow=0.71 cfs	0.034 af
Pond 17: CB17	Peak Elev=329.59'	Inflow=2.77 cfs	0.137 af
	15.0" Round Culvert n=0.013 L=127.0' S=0.0041 '/'	Outflow=2.77 cfs	0.137 af
Pond 18: CB18	Peak Elev=329.65'	Inflow=2.43 cfs	0.121 af
	15.0" Round Culvert n=0.013 L=16.0' S=0.0038 '/'	Outflow=2.43 cfs	0.121 af
Pond 19: CB19	Peak Elev=330.12'	Inflow=5.76 cfs	0.281 af
	18.0" Round Culvert n=0.013 L=160.0' S=0.0041 '/'	Outflow=5.76 cfs	0.281 af
Pond 20: CB20	Peak Elev=329.83'	Inflow=2.25 cfs	0.109 af
	15.0" Round Culvert n=0.013 L=52.0' S=0.0040 '/'	Outflow=2.25 cfs	0.109 af
Pond 21: CB21	Peak Elev=329.55'	Inflow=0.73 cfs	0.036 af
	15.0" Round Culvert n=0.013 L=22.0' S=0.0041 '/'	Outflow=0.73 cfs	0.036 af
Pond 22: CB22	Peak Elev=330.57'	Inflow=0.67 cfs	0.033 af
	15.0" Round Culvert n=0.013 L=350.0' S=0.0040 '/'	Outflow=0.67 cfs	0.033 af
Pond 23: CB23	Peak Elev=330.60'	Inflow=0.38 cfs	0.019 af
	15.0" Round Culvert n=0.013 L=21.0' S=0.0043 '/'	Outflow=0.38 cfs	0.019 af

Total Runoff Area = 5.980 ac Runoff Volume = 2.171 af Average Runoff Depth = 4.36"
25.59% Pervious = 1.530 ac 74.41% Impervious = 4.450 ac

Summary for Subcatchment 1S: DA-SUB1

Runoff = 4.28 cfs @ 11.93 hrs, Volume= 0.208 af, Depth= 4.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.400	98	Impervious
0.190	80	>75% Grass cover, Good, HSG D
0.590		Weighted Average
0.190	80	32.20% Pervious Area
0.400	98	67.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 2S: DA-SUB2

Runoff = 3.63 cfs @ 11.93 hrs, Volume= 0.177 af, Depth= 4.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.340	98	Impervious
0.160	80	>75% Grass cover, Good, HSG D
0.500		Weighted Average
0.160	80	32.00% Pervious Area
0.340	98	68.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 3S: DA-SUB3

Runoff = 3.14 cfs @ 11.93 hrs, Volume= 0.153 af, Depth= 4.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.300	98	Impervious
0.130	80	>75% Grass cover, Good, HSG D
0.430		Weighted Average
0.130	80	30.23% Pervious Area
0.300	98	69.77% Impervious Area

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Type II 24-hr 100 year Rainfall=5.08"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 4S: DA-SUB4

Runoff = 3.86 cfs @ 11.93 hrs, Volume= 0.192 af, Depth= 4.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.420	98	Impervious
0.090	80	>75% Grass cover, Good, HSG D
0.510		Weighted Average
0.090	80	17.65% Pervious Area
0.420	98	82.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 5S: DA-SUB5

Runoff = 1.56 cfs @ 11.93 hrs, Volume= 0.077 af, Depth= 4.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.160	98	Impervious
0.050	80	>75% Grass cover, Good, HSG D
0.210		Weighted Average
0.050	80	23.81% Pervious Area
0.160	98	76.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 6S: DA-SUB6

Runoff = 3.02 cfs @ 11.93 hrs, Volume= 0.148 af, Depth= 4.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

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Area (ac)	CN	Description
* 0.300	98	Impervious
0.110	80	>75% Grass cover, Good, HSG D
0.410		Weighted Average
0.110	80	26.83% Pervious Area
0.300	98	73.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 7S: DA-SUB7

Runoff = 2.11 cfs @ 11.93 hrs, Volume= 0.103 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.200	98	Impervious
0.090	80	>75% Grass cover, Good, HSG D
0.290		Weighted Average
0.090	80	31.03% Pervious Area
0.200	98	68.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 8S: DA-SUB8

Runoff = 2.14 cfs @ 11.93 hrs, Volume= 0.107 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.240	98	Impervious
0.040	80	>75% Grass cover, Good, HSG D
0.280		Weighted Average
0.040	80	14.29% Pervious Area
0.240	98	85.71% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 9S: DA-SUB9

Runoff = 3.33 cfs @ 11.93 hrs, Volume= 0.167 af, Depth= 4.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.390	98	Impervious
0.040	80	>75% Grass cover, Good, HSG D
0.430		Weighted Average
0.040	80	9.30% Pervious Area
0.390	98	90.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 10S: DA-SUB10

Runoff = 1.27 cfs @ 11.93 hrs, Volume= 0.063 af, Depth= 4.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.130	98	Impervious
0.050	74	>75% Grass cover, Good, HSG C
0.180		Weighted Average
0.050	74	27.78% Pervious Area
0.130	98	72.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 11S: DA-SUB11

Runoff = 0.33 cfs @ 11.94 hrs, Volume= 0.015 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.020	98	Impervious
0.030	80	>75% Grass cover, Good, HSG D
0.050		Weighted Average
0.030	80	60.00% Pervious Area
0.020	98	40.00% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 12S: DA-SUB12

Runoff = 3.47 cfs @ 11.93 hrs, Volume= 0.174 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.400	98	Impervious
0.050	80	>75% Grass cover, Good, HSG D
0.450		Weighted Average
0.050	80	11.11% Pervious Area
0.400	98	88.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 13S: DA-SUB13

Runoff = 0.82 cfs @ 11.94 hrs, Volume= 0.039 af, Depth= 3.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.060	98	Impervious
0.060	80	>75% Grass cover, Good, HSG D
0.120		Weighted Average
0.060	80	50.00% Pervious Area
0.060	98	50.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 14S: DA-SUB14

Runoff = 0.72 cfs @ 11.94 hrs, Volume= 0.033 af, Depth= 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

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Area (ac)	CN	Description
* 0.040	98	Impervious
0.070	80	>75% Grass cover, Good, HSG D
0.110		Weighted Average
0.070	80	63.64% Pervious Area
0.040	98	36.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 15S: DA-SUB15

Runoff = 0.32 cfs @ 11.93 hrs, Volume= 0.016 af, Depth= 4.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.040	98	Impervious
0.040	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 16S: DA-SUB16

Runoff = 0.71 cfs @ 11.93 hrs, Volume= 0.034 af, Depth= 4.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.060	98	Impervious
0.040	80	>75% Grass cover, Good, HSG D
0.100		Weighted Average
0.040	80	40.00% Pervious Area
0.060	98	60.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

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Type II 24-hr 100 year Rainfall=5.08"

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Summary for Subcatchment 17S: DA-SUB17

Runoff = 0.33 cfs @ 11.94 hrs, Volume= 0.015 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.020	98	Impervious
0.030	80	>75% Grass cover, Good, HSG D
0.050		Weighted Average
0.030	80	60.00% Pervious Area
0.020	98	40.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 18S: DA-SUB18

Runoff = 2.43 cfs @ 11.93 hrs, Volume= 0.121 af, Depth= 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.270	98	Impervious
0.050	80	>75% Grass cover, Good, HSG D
0.320		Weighted Average
0.050	80	15.63% Pervious Area
0.270	98	84.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 19S: DA-SUB19

Runoff = 2.84 cfs @ 11.93 hrs, Volume= 0.139 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.270	98	Impervious
0.120	80	>75% Grass cover, Good, HSG D
0.390		Weighted Average
0.120	80	30.77% Pervious Area
0.270	98	69.23% Impervious Area

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Type II 24-hr 100 year Rainfall=5.08"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 20S: DA-SUB20

Runoff = 1.52 cfs @ 11.93 hrs, Volume= 0.074 af, Depth= 4.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.140	98	Impervious
0.070	80	>75% Grass cover, Good, HSG D
0.210		Weighted Average
0.070	80	33.33% Pervious Area
0.140	98	66.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 21S: DA-SUB21

Runoff = 0.73 cfs @ 11.93 hrs, Volume= 0.036 af, Depth= 4.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.070	98	Impervious
0.030	80	>75% Grass cover, Good, HSG D
0.100		Weighted Average
0.030	80	30.00% Pervious Area
0.070	98	70.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 22S: DA-SUB22

Runoff = 0.30 cfs @ 11.93 hrs, Volume= 0.015 af, Depth= 4.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

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Type II 24-hr 100 year Rainfall=5.08"

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Area (ac)	CN	Description
* 0.030	98	Impervious
0.010	80	>75% Grass cover, Good, HSG D
0.040		Weighted Average
0.010	80	25.00% Pervious Area
0.030	98	75.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 23S: DA-SUB23

Runoff = 0.38 cfs @ 11.93 hrs, Volume= 0.019 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.040	98	Impervious
0.010	80	>75% Grass cover, Good, HSG D
0.050		Weighted Average
0.010	80	20.00% Pervious Area
0.040	98	80.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Subcatchment 24S: DA-SUB22

Runoff = 0.93 cfs @ 11.93 hrs, Volume= 0.047 af, Depth= 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.110	98	Impervious
0.010	80	>75% Grass cover, Good, HSG D
0.120		Weighted Average
0.010	80	8.33% Pervious Area
0.110	98	91.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					Direct Entry, Direct

Summary for Pond 1: CB1

[81] Warning: Exceeded Pond 2 by 0.79' @ 11.93 hrs

[81] Warning: Exceeded Pond 17 by 2.80' @ 11.93 hrs

Inflow Area = 5.070 ac, 74.75% Impervious, Inflow Depth = 4.36" for 100 year event
 Inflow = 37.46 cfs @ 11.93 hrs, Volume= 1.843 af
 Outflow = 37.46 cfs @ 11.93 hrs, Volume= 1.843 af, Atten= 0%, Lag= 0.0 min
 Primary = 37.46 cfs @ 11.93 hrs, Volume= 1.843 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Peak Elev= 332.40' @ 11.93 hrs
 Flood Elev= 332.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	328.00'	30.0" Round Culvert L= 125.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 328.00' / 327.50' S= 0.0040 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf

Primary OutFlow Max=37.34 cfs @ 11.93 hrs HW=332.39' (Free Discharge)
 ↑1=Culvert (Barrel Controls 37.34 cfs @ 7.61 fps)

Summary for Pond 1F: Forebay #1

[81] Warning: Exceeded Pond 1 by 0.01' @ 24.16 hrs

[79] Warning: Submerged Pond 19 Primary device # 1 INLET by 0.20'

Inflow Area = 5.860 ac, 74.06% Impervious, Inflow Depth = 4.35" for 100 year event
 Inflow = 43.22 cfs @ 11.93 hrs, Volume= 2.125 af
 Outflow = 41.85 cfs @ 11.95 hrs, Volume= 2.125 af, Atten= 3%, Lag= 0.9 min
 Primary = 41.85 cfs @ 11.95 hrs, Volume= 2.125 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Starting Elev= 328.00' Surf.Area= 2,628 sf Storage= 3,057 cf
 Peak Elev= 328.86' @ 11.95 hrs Surf.Area= 4,777 sf Storage= 6,185 cf (3,127 cf above start)

Plug-Flow detention time= 41.3 min calculated for 2.054 af (97% of inflow)
 Center-of-Mass det. time= 2.5 min (756.5 - 754.0)

Volume	Invert	Avail.Storage	Storage Description			
#1	326.00'	13,093 cf	Forebay Storage (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
326.00	513	516.0	0	0	513	
327.00	1,557	529.0	988	988	1,714	
328.00	2,628	541.0	2,069	3,057	2,867	
329.00	5,198	591.0	3,841	6,898	7,407	
330.00	7,249	696.0	6,195	13,093	18,180	

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Device	Routing	Invert	Outlet Devices
#1	Primary	328.00'	20.0' long x 18.0' breadth Stone Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=41.79 cfs @ 11.95 hrs HW=328.86' (Free Discharge)
 ←1=Stone Spillway (Weir Controls 41.79 cfs @ 2.44 fps)

Summary for Pond 1P: Gravel Wetland

[42] Hint: Gap in defined storage above volume #1 at 326.08'

[81] Warning: Exceeded Pond 1F by 0.23' @ 12.06 hrs

Inflow Area = 5.980 ac, 74.41% Impervious, Inflow Depth = 4.36" for 100 year event
 Inflow = 42.75 cfs @ 11.95 hrs, Volume= 2.171 af
 Outflow = 38.94 cfs @ 11.98 hrs, Volume= 2.171 af, Atten= 9%, Lag= 1.7 min
 Primary = 3.49 cfs @ 11.98 hrs, Volume= 0.602 af
 Secondary = 35.45 cfs @ 11.98 hrs, Volume= 1.570 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Starting Elev= 326.42' Surf.Area= 8,003 sf Storage= 6,634 cf
 Peak Elev= 328.81' @ 11.98 hrs Surf.Area= 18,701 sf Storage= 26,272 cf (19,638 cf above start)

Plug-Flow detention time= 386.2 min calculated for 2.019 af (93% of inflow)
 Center-of-Mass det. time= 310.4 min (1,066.6 - 756.2)

Volume	Invert	Avail.Storage	Storage Description
#1	323.83'	6,634 cf	2.25' Stone Storage (Irregular) Listed below (Recalc) 16,585 cf Overall x 40.0% Voids
#2	326.75'	33,290 cf	Surface Storage (Irregular) Listed below (Recalc)
		39,924 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
323.83	6,757	545.0	0	0	6,757
326.08	8,003	573.0	16,585	16,585	9,548

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
326.75	8,380	568.0	0	0	8,380
327.00	8,664	571.0	2,130	2,130	8,687
328.00	9,820	584.0	9,236	11,366	10,014
329.00	10,914	602.0	10,362	21,729	11,813
330.00	12,221	612.0	11,561	33,290	12,954

Device	Routing	Invert	Outlet Devices
#1	Primary	326.42'	18.0" Round 18" Outlet Pipe L= 11.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 326.42' / 326.25' S= 0.0155 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	326.42'	1.6" Vert. 1.6" Orifice C= 0.600 Limited to weir flow at low heads

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#3	Device 1	328.05'	12.0" W x 6.0" H Vert. Two 12"(W)x6"(H) Orifice X 2.00 C= 0.600 Limited to weir flow at low heads
#4	Secondary	328.05'	20.0' long x 10.0' breadth Stone Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=3.49 cfs @ 11.98 hrs HW=328.81' (Free Discharge)

↑ **1=18" Outlet Pipe** (Passes 3.49 cfs of 10.88 cfs potential flow)

↑ **2=1.6" Orifice** (Orifice Controls 0.10 cfs @ 7.33 fps)

↑ **3=Two 12"(W)x6"(H) Orifice** (Orifice Controls 3.39 cfs @ 3.39 fps)

Secondary OutFlow Max=35.37 cfs @ 11.98 hrs HW=328.81' (Free Discharge)

↑ **4=Stone Spillway** (Weir Controls 35.37 cfs @ 2.34 fps)

Summary for Pond 2: CB2

[79] Warning: Submerged Pond 3 Primary device # 1 INLET by 2.88'

[81] Warning: Exceeded Pond 14 by 1.87' @ 11.93 hrs

Inflow Area = 4.110 ac, 75.43% Impervious, Inflow Depth = 4.37" for 100 year event
 Inflow = 30.42 cfs @ 11.93 hrs, Volume= 1.498 af
 Outflow = 30.42 cfs @ 11.93 hrs, Volume= 1.498 af, Atten= 0%, Lag= 0.0 min
 Primary = 30.42 cfs @ 11.93 hrs, Volume= 1.498 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 331.61' @ 11.93 hrs

Flood Elev= 332.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	328.17'	30.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 328.17' / 328.05' S= 0.0040 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf

Primary OutFlow Max=30.32 cfs @ 11.93 hrs HW=331.60' (Free Discharge)

↑ **1=Culvert** (Barrel Controls 30.32 cfs @ 6.18 fps)

Summary for Pond 3: CB3

[58] **Hint: Peaked 0.25' above defined flood level**

[81] Warning: Exceeded Pond 4 by 1.09' @ 11.93 hrs

Inflow Area = 3.240 ac, 79.01% Impervious, Inflow Depth = 4.44" for 100 year event
 Inflow = 24.22 cfs @ 11.93 hrs, Volume= 1.199 af
 Outflow = 24.22 cfs @ 11.93 hrs, Volume= 1.199 af, Atten= 0%, Lag= 0.0 min
 Primary = 24.22 cfs @ 11.93 hrs, Volume= 1.199 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 333.05' @ 11.93 hrs

Flood Elev= 332.80' WSE = 333.05', 3" ABOVE GRATE ELEVATION ON ROAD D

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Device	Routing	Invert	Outlet Devices
#1	Primary	328.72'	24.0" Round Culvert L= 126.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 328.72' / 328.22' S= 0.0040 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=24.14 cfs @ 11.93 hrs HW=333.03' (Free Discharge)

↑1=Culvert (Barrel Controls 24.14 cfs @ 7.68 fps)

Summary for Pond 4: CB4

[79] Warning: Submerged Pond 5 Primary device # 1 INLET by 2.54'

Inflow Area = 2.810 ac, 80.43% Impervious, Inflow Depth = 4.47" for 100 year event
 Inflow = 21.08 cfs @ 11.93 hrs, Volume= 1.046 af
 Outflow = 21.08 cfs @ 11.93 hrs, Volume= 1.046 af, Atten= 0%, Lag= 0.0 min
 Primary = 21.08 cfs @ 11.93 hrs, Volume= 1.046 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 331.96' @ 11.93 hrs

Flood Elev= 332.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	328.84'	24.0" Round Culvert L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 328.84' / 328.77' S= 0.0044 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=21.01 cfs @ 11.93 hrs HW=331.95' (Free Discharge)

↑1=Culvert (Barrel Controls 21.01 cfs @ 6.69 fps)

Summary for Pond 5: CB5

[79] Warning: Submerged Pond 6 Primary device # 1 INLET by 2.51'

[81] Warning: Exceeded Pond 12 by 0.77' @ 11.93 hrs

Inflow Area = 2.300 ac, 80.00% Impervious, Inflow Depth = 4.46" for 100 year event
 Inflow = 17.23 cfs @ 11.93 hrs, Volume= 0.854 af
 Outflow = 17.23 cfs @ 11.93 hrs, Volume= 0.854 af, Atten= 0%, Lag= 0.0 min
 Primary = 17.23 cfs @ 11.93 hrs, Volume= 0.854 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 332.34' @ 11.93 hrs

Flood Elev= 334.05'

Device	Routing	Invert	Outlet Devices
#1	Primary	329.41'	24.0" Round Culvert L= 129.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 329.41' / 328.89' S= 0.0040 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=17.17 cfs @ 11.93 hrs HW=332.33' (Free Discharge)

↑1=Culvert (Barrel Controls 17.17 cfs @ 5.47 fps)

Summary for Pond 6: CB6

[81] Warning: Exceeded Pond 7 by 0.91' @ 11.93 hrs

Inflow Area = 1.410 ac, 80.14% Impervious, Inflow Depth = 4.47" for 100 year event
 Inflow = 10.59 cfs @ 11.93 hrs, Volume= 0.525 af
 Outflow = 10.59 cfs @ 11.93 hrs, Volume= 0.525 af, Atten= 0%, Lag= 0.0 min
 Primary = 10.59 cfs @ 11.93 hrs, Volume= 0.525 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 332.73' @ 11.93 hrs

Flood Elev= 333.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	329.82'	18.0" Round Culvert L= 91.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 329.82' / 329.46' S= 0.0040 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=10.56 cfs @ 11.93 hrs HW=332.71' (Free Discharge)

↑1=Culvert (Barrel Controls 10.56 cfs @ 5.98 fps)

Summary for Pond 7: CB7

[79] Warning: Submerged Pond 8 Primary device # 1 INLET by 1.71'

Inflow Area = 1.000 ac, 83.00% Impervious, Inflow Depth = 4.52" for 100 year event
 Inflow = 7.58 cfs @ 11.93 hrs, Volume= 0.377 af
 Outflow = 7.58 cfs @ 11.93 hrs, Volume= 0.377 af, Atten= 0%, Lag= 0.0 min
 Primary = 7.58 cfs @ 11.93 hrs, Volume= 0.377 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 331.81' @ 11.93 hrs

Flood Elev= 333.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	329.95'	18.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 329.95' / 329.87' S= 0.0040 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=7.55 cfs @ 11.93 hrs HW=331.81' (Free Discharge)

↑1=Culvert (Barrel Controls 7.55 cfs @ 4.42 fps)

Summary for Pond 8: CB8

[79] Warning: Submerged Pond 9 Primary device # 1 INLET by 1.52'

Inflow Area = 0.710 ac, 88.73% Impervious, Inflow Depth = 4.63" for 100 year event
 Inflow = 5.47 cfs @ 11.93 hrs, Volume= 0.274 af
 Outflow = 5.47 cfs @ 11.93 hrs, Volume= 0.274 af, Atten= 0%, Lag= 0.0 min
 Primary = 5.47 cfs @ 11.93 hrs, Volume= 0.274 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Peak Elev= 331.90' @ 11.93 hrs
 Flood Elev= 333.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	330.10'	15.0" Round Culvert L= 26.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 330.10' / 330.00' S= 0.0038 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=5.45 cfs @ 11.93 hrs HW=331.89' (Free Discharge)
 ↑1=Culvert (Barrel Controls 5.45 cfs @ 4.44 fps)

Summary for Pond 9: CB9

Inflow Area = 0.430 ac, 90.70% Impervious, Inflow Depth = 4.67" for 100 year event
 Inflow = 3.33 cfs @ 11.93 hrs, Volume= 0.167 af
 Outflow = 3.33 cfs @ 11.93 hrs, Volume= 0.167 af, Atten= 0%, Lag= 0.0 min
 Primary = 3.33 cfs @ 11.93 hrs, Volume= 0.167 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Peak Elev= 332.08' @ 11.93 hrs
 Flood Elev= 333.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	330.38'	12.0" Round Culvert L= 58.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 330.38' / 330.15' S= 0.0040 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.32 cfs @ 11.93 hrs HW=332.07' (Free Discharge)
 ↑1=Culvert (Barrel Controls 3.32 cfs @ 4.22 fps)

Summary for Pond 10: YI

Inflow Area = 0.180 ac, 72.22% Impervious, Inflow Depth = 4.17" for 100 year event
 Inflow = 1.27 cfs @ 11.93 hrs, Volume= 0.063 af
 Outflow = 1.27 cfs @ 11.93 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.27 cfs @ 11.93 hrs, Volume= 0.063 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

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Peak Elev= 331.81' @ 11.93 hrs

Flood Elev= 332.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	330.54'	8.0" Round Culvert L= 49.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 330.54' / 330.29' S= 0.0051 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.35 sf

Primary OutFlow Max=1.27 cfs @ 11.93 hrs HW=331.81' (Free Discharge)↑**1=Culvert** (Barrel Controls 1.27 cfs @ 3.64 fps)**Summary for Pond 11: YI**

[79] Warning: Submerged Pond 10 Primary device # 1 INLET by 0.59'

Inflow Area = 0.230 ac, 65.22% Impervious, Inflow Depth = 4.07" for 100 year event
 Inflow = 1.61 cfs @ 11.93 hrs, Volume= 0.078 af
 Outflow = 1.61 cfs @ 11.93 hrs, Volume= 0.078 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.61 cfs @ 11.93 hrs, Volume= 0.078 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 331.13' @ 11.93 hrs

Flood Elev= 333.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	330.29'	12.0" Round Culvert L= 119.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 330.29' / 329.81' S= 0.0040 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.60 cfs @ 11.93 hrs HW=331.13' (Free Discharge)↑**1=Culvert** (Barrel Controls 1.60 cfs @ 3.09 fps)**Summary for Pond 12: CB12**

[81] Warning: Exceeded Pond 11 by 0.43' @ 11.93 hrs

Inflow Area = 0.680 ac, 80.88% Impervious, Inflow Depth = 4.44" for 100 year event
 Inflow = 5.07 cfs @ 11.93 hrs, Volume= 0.252 af
 Outflow = 5.07 cfs @ 11.93 hrs, Volume= 0.252 af, Atten= 0%, Lag= 0.0 min
 Primary = 5.07 cfs @ 11.93 hrs, Volume= 0.252 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 331.57' @ 11.93 hrs

Flood Elev= 334.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	329.76'	15.0" Round Culvert L= 74.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 329.76' / 329.46' S= 0.0041 '/' Cc= 0.900

n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=5.06 cfs @ 11.93 hrs HW=331.56' (Free Discharge)

↑1=Culvert (Barrel Controls 5.06 cfs @ 4.12 fps)

Summary for Pond 13: CB13

Inflow Area = 0.120 ac, 50.00% Impervious, Inflow Depth = 3.90" for 100 year event
 Inflow = 0.82 cfs @ 11.94 hrs, Volume= 0.039 af
 Outflow = 0.82 cfs @ 11.94 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.82 cfs @ 11.94 hrs, Volume= 0.039 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 329.51' @ 11.94 hrs

Flood Elev= 334.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	328.98'	15.0" Round Culvert L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 328.98' / 328.90' S= 0.0040 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.82 cfs @ 11.94 hrs HW=329.51' (Free Discharge)

↑1=Culvert (Barrel Controls 0.82 cfs @ 2.47 fps)

Summary for Pond 14: CB14

[81] Warning: Exceeded Pond 13 by 0.22' @ 11.93 hrs

[79] Warning: Submerged Pond 15 Primary device # 1 INLET by 0.26'

Inflow Area = 0.370 ac, 54.05% Impervious, Inflow Depth = 3.98" for 100 year event
 Inflow = 2.58 cfs @ 11.94 hrs, Volume= 0.123 af
 Outflow = 2.58 cfs @ 11.94 hrs, Volume= 0.123 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.58 cfs @ 11.94 hrs, Volume= 0.123 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 329.73' @ 11.94 hrs

Flood Elev= 333.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	328.85'	18.0" Round Culvert L= 155.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 328.85' / 328.22' S= 0.0041 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=2.56 cfs @ 11.94 hrs HW=329.73' (Free Discharge)

↑1=Culvert (Barrel Controls 2.56 cfs @ 3.42 fps)

Summary for Pond 15: CB15

[79] Warning: Submerged Pond 16 Primary device # 1 INLET by 0.37'

Inflow Area = 0.140 ac, 71.43% Impervious, Inflow Depth = 4.31" for 100 year event
 Inflow = 1.03 cfs @ 11.93 hrs, Volume= 0.050 af
 Outflow = 1.03 cfs @ 11.93 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.03 cfs @ 11.93 hrs, Volume= 0.050 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Peak Elev= 330.04' @ 11.93 hrs
 Flood Elev= 334.15'

Device	Routing	Invert	Outlet Devices
#1	Primary	329.47'	15.0" Round Culvert L= 138.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 329.47' / 328.90' S= 0.0041 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=1.02 cfs @ 11.93 hrs HW=330.04' (Free Discharge)
 ↑1=Culvert (Barrel Controls 1.02 cfs @ 2.74 fps)

Summary for Pond 16: CB16

Inflow Area = 0.100 ac, 60.00% Impervious, Inflow Depth = 4.09" for 100 year event
 Inflow = 0.71 cfs @ 11.93 hrs, Volume= 0.034 af
 Outflow = 0.71 cfs @ 11.93 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.71 cfs @ 11.93 hrs, Volume= 0.034 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Peak Elev= 330.15' @ 11.93 hrs
 Flood Elev= 333.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	329.67'	15.0" Round Culvert L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 329.67' / 329.52' S= 0.0042 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.71 cfs @ 11.93 hrs HW=330.15' (Free Discharge)
 ↑1=Culvert (Barrel Controls 0.71 cfs @ 2.42 fps)

Summary for Pond 17: CB17

[79] Warning: Submerged Pond 18 Primary device # 1 INLET by 0.91'

Inflow Area = 0.370 ac, 78.38% Impervious, Inflow Depth = 4.44" for 100 year event
 Inflow = 2.77 cfs @ 11.93 hrs, Volume= 0.137 af
 Outflow = 2.77 cfs @ 11.93 hrs, Volume= 0.137 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.77 cfs @ 11.93 hrs, Volume= 0.137 af

19054-HCII - pipe network

Type II 24-hr 100 year Rainfall=5.08"

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Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 329.59' @ 11.93 hrs

Flood Elev= 333.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	328.57'	15.0" Round Culvert L= 127.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 328.57' / 328.05' S= 0.0041 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.76 cfs @ 11.93 hrs HW=329.59' (Free Discharge)

↑1=Culvert (Barrel Controls 2.76 cfs @ 3.51 fps)

Summary for Pond 18: CB18

Inflow Area = 0.320 ac, 84.38% Impervious, Inflow Depth = 4.55" for 100 year event
Inflow = 2.43 cfs @ 11.93 hrs, Volume= 0.121 af
Outflow = 2.43 cfs @ 11.93 hrs, Volume= 0.121 af, Atten= 0%, Lag= 0.0 min
Primary = 2.43 cfs @ 11.93 hrs, Volume= 0.121 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 329.65' @ 11.93 hrs

Flood Elev= 333.60'

Device	Routing	Invert	Outlet Devices
#1	Primary	328.68'	15.0" Round Culvert L= 16.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 328.68' / 328.62' S= 0.0038 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.43 cfs @ 11.93 hrs HW=329.65' (Free Discharge)

↑1=Culvert (Barrel Controls 2.43 cfs @ 3.26 fps)

Summary for Pond 19: CB19

[81] Warning: Exceeded Pond 20 by 0.29' @ 11.93 hrs

[79] Warning: Submerged Pond 22 Primary device # 1 INLET by 0.01'

Inflow Area = 0.790 ac, 69.62% Impervious, Inflow Depth = 4.27" for 100 year event
Inflow = 5.76 cfs @ 11.93 hrs, Volume= 0.281 af
Outflow = 5.76 cfs @ 11.93 hrs, Volume= 0.281 af, Atten= 0%, Lag= 0.0 min
Primary = 5.76 cfs @ 11.93 hrs, Volume= 0.281 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 330.12' @ 11.93 hrs

Flood Elev= 332.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	328.66'	18.0" Round Culvert L= 160.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 328.66' / 328.00' S= 0.0041 '/ Cc= 0.900

n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=5.74 cfs @ 11.93 hrs HW=330.12' (Free Discharge)

↑1=Culvert (Barrel Controls 5.74 cfs @ 4.17 fps)

Summary for Pond 20: CB20

[81] Warning: Exceeded Pond 21 by 0.28' @ 11.93 hrs

Inflow Area = 0.310 ac, 67.74% Impervious, Inflow Depth = 4.24" for 100 year event
 Inflow = 2.25 cfs @ 11.93 hrs, Volume= 0.109 af
 Outflow = 2.25 cfs @ 11.93 hrs, Volume= 0.109 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.25 cfs @ 11.93 hrs, Volume= 0.109 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 329.83' @ 11.93 hrs

Flood Elev= 331.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	328.92'	15.0" Round Culvert L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 328.92' / 328.71' S= 0.0040 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.24 cfs @ 11.93 hrs HW=329.83' (Free Discharge)

↑1=Culvert (Barrel Controls 2.24 cfs @ 3.27 fps)

Summary for Pond 21: CB21

Inflow Area = 0.100 ac, 70.00% Impervious, Inflow Depth = 4.28" for 100 year event
 Inflow = 0.73 cfs @ 11.93 hrs, Volume= 0.036 af
 Outflow = 0.73 cfs @ 11.93 hrs, Volume= 0.036 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.73 cfs @ 11.93 hrs, Volume= 0.036 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 329.55' @ 11.93 hrs

Flood Elev= 331.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	329.06'	15.0" Round Culvert L= 22.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 329.06' / 328.97' S= 0.0041 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.73 cfs @ 11.93 hrs HW=329.55' (Free Discharge)

↑1=Culvert (Barrel Controls 0.73 cfs @ 2.41 fps)

Summary for Pond 22: CB22

[79] Warning: Submerged Pond 23 Primary device # 1 INLET by 0.32'

Inflow Area = 0.090 ac, 77.78% Impervious, Inflow Depth = 4.43" for 100 year event
 Inflow = 0.67 cfs @ 11.93 hrs, Volume= 0.033 af
 Outflow = 0.67 cfs @ 11.93 hrs, Volume= 0.033 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.67 cfs @ 11.93 hrs, Volume= 0.033 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Peak Elev= 330.57' @ 11.93 hrs
 Flood Elev= 333.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	330.11'	15.0" Round Culvert L= 350.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 330.11' / 328.71' S= 0.0040 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.67 cfs @ 11.93 hrs HW=330.57' (Free Discharge)
 ↑**1=Culvert** (Barrel Controls 0.67 cfs @ 2.44 fps)

Summary for Pond 23: CB23

Inflow Area = 0.050 ac, 80.00% Impervious, Inflow Depth = 4.47" for 100 year event
 Inflow = 0.38 cfs @ 11.93 hrs, Volume= 0.019 af
 Outflow = 0.38 cfs @ 11.93 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.38 cfs @ 11.93 hrs, Volume= 0.019 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
 Peak Elev= 330.60' @ 11.93 hrs
 Flood Elev= 333.30'

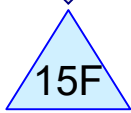
Device	Routing	Invert	Outlet Devices
#1	Primary	330.25'	15.0" Round Culvert L= 21.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 330.25' / 330.16' S= 0.0043 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.37 cfs @ 11.93 hrs HW=330.60' (Free Discharge)
 ↑**1=Culvert** (Barrel Controls 0.37 cfs @ 2.04 fps)

**APPENDIX H
STORM SYSTEM MODELLING
(INTO CREEKSIDE - CPv, Qp10, Qp100)**



DA-4



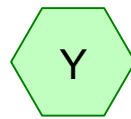
Forebay #2



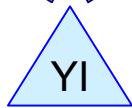
Bioretention Basin



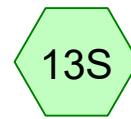
Lot 30



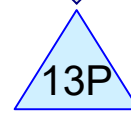
Backside of lots 19-29



Lot 30 Drainage Improvements



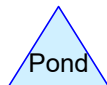
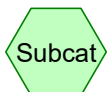
DA-3



(2) 10'x6' Filterra Units (FTIBC1006)



Pipe Storage



Routing Diagram for 19054-Lot 30

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19054-Lot 30**Type II 24-hr 1 year Rainfall=1.99"**

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Time span=0.00-120.00 hrs, dt=0.01 hrs, 12001 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 13S: DA-3 Runoff Area=0.460 ac 0.00% Impervious Runoff Depth=1.31"
 Flow Length=131' Slope=0.0450 '/' Tc=1.8 min CN=93 Runoff=1.20 cfs 0.050 af

Subcatchment 15S: DA-4 Runoff Area=0.140 ac 0.00% Impervious Runoff Depth=0.90"
 Flow Length=64' Slope=0.1500 '/' Tc=0.7 min CN=87 Runoff=0.27 cfs 0.010 af

Subcatchment AA: Lot 30 Runoff Area=1.160 ac 0.00% Impervious Runoff Depth=0.35"
 Flow Length=450' Slope=0.0060 '/' Tc=6.5 min CN=74 Runoff=0.61 cfs 0.033 af

Subcatchment Y: Backside of lots 19-29 Runoff Area=0.710 ac 0.00% Impervious Runoff Depth=0.84"
 Tc=19.4 min CN=86 Runoff=0.67 cfs 0.050 af

Pond 13P: (2) 10'x6' Filterra Units (FTIBC1006) Peak Elev=329.09' Storage=106 cf Inflow=1.20 cfs 0.050 af
 Outflow=1.19 cfs 0.050 af

Pond 14P: Pipe Storage Peak Elev=327.02' Storage=0.029 af Inflow=1.19 cfs 0.050 af
 Outflow=0.03 cfs 0.050 af

Pond 15F: Forebay #2 Peak Elev=328.55' Storage=317 cf Inflow=0.27 cfs 0.010 af
 Outflow=0.26 cfs 0.010 af

Pond 15P: Bioretention Basin Peak Elev=328.85' Storage=351 cf Inflow=0.26 cfs 0.010 af
 Outflow=0.00 cfs 0.010 af

Pond YI: Lot 30 Drainage Improvements Peak Elev=328.52' Storage=1,893 cf Inflow=1.07 cfs 0.083 af
 Outflow=0.05 cfs 0.083 af

Total Runoff Area = 2.470 ac Runoff Volume = 0.144 af Average Runoff Depth = 0.70"
100.00% Pervious = 2.470 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 13S: DA-3

Runoff = 1.20 cfs @ 11.92 hrs, Volume= 0.050 af, Depth= 1.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 year Rainfall=1.99"

Area (ac)	CN	Description
* 0.460	93	Modified CN
0.460	93	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	131	0.0450	1.20		Lag/CN Method, LAG

Summary for Subcatchment 15S: DA-4

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.27 cfs @ 11.91 hrs, Volume= 0.010 af, Depth= 0.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 year Rainfall=1.99"

Area (ac)	CN	Description
* 0.140	87	Modified CN
0.140	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	64	0.1500	1.49		Lag/CN Method, LAG

Summary for Subcatchment AA: Lot 30

Runoff = 0.61 cfs @ 12.00 hrs, Volume= 0.033 af, Depth= 0.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 year Rainfall=1.99"

Area (ac)	CN	Description
1.160	74	>75% Grass cover, Good, HSG C
1.160	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	450	0.0060	1.16		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps

Summary for Subcatchment Y: Backside of lots 19-29

Runoff = 0.67 cfs @ 12.13 hrs, Volume= 0.050 af, Depth= 0.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 1 year Rainfall=1.99"

Area (ac)	CN	Description
* 0.710	86	
0.710	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.4					Direct Entry,

Summary for Pond 13P: (2) 10'x6' Filterra Units (FTIBC1006)

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 1.31" for 1 year event
 Inflow = 1.20 cfs @ 11.92 hrs, Volume= 0.050 af
Outflow = 1.19 cfs @ 11.93 hrs, Volume= 0.050 af, Atten= 1%, Lag= 0.2 min
Primary = 1.19 cfs @ 11.93 hrs, Volume= 0.050 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 329.09' @ 11.93 hrs Surf.Area= 120 sf Storage= 106 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 0.7 min (804.0 - 803.3)

Volume	Invert	Avail.Storage	Storage Description
#1	328.21'	132 cf	6.00'W x 10.00'L x 1.10'H Vault x 2

Device	Routing	Invert	Outlet Devices
#1	Device 3	328.21'	140.000 in/hr Filtration over Surface area from 328.20' - 328.22' Excluded Surface area = 0 sf
#2	Device 3	328.96'	10.0" Horiz. 10" Overflow Pipe X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	325.71'	10.0" Round 10" PVC Pipe L= 54.0' Ke= 0.200 Inlet / Outlet Invert= 325.71' / 324.98' S= 0.0135 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=1.19 cfs @ 11.93 hrs HW=329.09' (Free Discharge)
 ↑ **3=10" PVC Pipe** (Passes 1.19 cfs of 5.03 cfs potential flow)
 ↑ **1=10" Filtration** (Exfiltration Controls 0.39 cfs)
 ↑ **2=10" Overflow Pipe** (Weir Controls 0.80 cfs @ 1.18 fps)

Summary for Pond 14P: Pipe Storage

[79] Warning: Submerged Pond 13P Primary device # 3 INLET by 1.31'

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 1.31" for 1 year event
 Inflow = 1.19 cfs @ 11.93 hrs, Volume= 0.050 af
Outflow = 0.03 cfs @ 13.77 hrs, Volume= 0.050 af, Atten= 97%, Lag= 110.4 min
Primary = 0.03 cfs @ 13.77 hrs, Volume= 0.050 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Peak Elev= 327.02' @ 13.77 hrs Surf.Area= 0.021 ac Storage= 0.029 af

Plug-Flow detention time= 425.2 min calculated for 0.050 af (100% of inflow)
 Center-of-Mass det. time= 425.1 min (1,229.1 - 804.0)

Volume	Invert	Avail.Storage	Storage Description
#1	325.25'	0.066 af	48.0" Round 48" Pipe L= 230.0'
#2	325.25'	0.001 af	4.00'D x 4.50'H Drainage Manhole
		0.068 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Device 3	325.25'	1.0" Vert. 1" Orifice C= 0.600 Limited to weir flow at low heads
#2	Device 3	328.95'	5.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#3	Primary	325.25'	15.0" Round 15" Outlet Pipe L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 325.25' / 324.98' S= 0.0054 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.03 cfs @ 13.77 hrs HW=327.02' (Free Discharge)
 3=15" Outlet Pipe (Passes 0.03 cfs of 5.35 cfs potential flow)
 1=1" Orifice (Orifice Controls 0.03 cfs @ 6.33 fps)
 2=Sharp-Crested Rectangular Weir(Controls 0.00 cfs)

Summary for Pond 15F: Forebay #2

Inflow Area = 0.140 ac, 0.00% Impervious, Inflow Depth = 0.90" for 1 year event
 Inflow = 0.27 cfs @ 11.91 hrs, Volume= 0.010 af
Outflow = 0.26 cfs @ 11.92 hrs, Volume= 0.010 af, Atten= 3%, Lag= 0.6 min
Primary = 0.26 cfs @ 11.92 hrs, Volume= 0.010 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Starting Elev= 328.50' Surf.Area= 278 sf Storage= 302 cf
Peak Elev= 328.55' @ 11.92 hrs Surf.Area= 289 sf Storage= 317 cf (14 cf above start)

Plug-Flow detention time= 353.0 min calculated for 0.004 af (34% of inflow)
 Center-of-Mass det. time= 1.2 min (833.7 - 832.6)

19054-Lot 30

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Type II 24-hr 1 year Rainfall=1.99"

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Volume	Invert	Avail.Storage	Storage Description
#1	326.50'	470 cf	Forebay Storage (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
326.50	43	46.0	0	0	43
327.00	93	53.0	33	33	103
328.00	210	65.0	148	181	231
328.50	278	71.0	122	302	304
329.00	395	87.0	167	470	509

Device	Routing	Invert	Outlet Devices
#1	Primary	328.50'	10.0' long x 5.0' breadth Stone Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.26 cfs @ 11.92 hrs HW=328.55' (Free Discharge)

↑**1=Stone Spillway** (Weir Controls 0.26 cfs @ 0.52 fps)

Summary for Pond 15P: Bioretention Basin

[81] Warning: Exceeded Pond 15F by 0.34' @ 24.04 hrs

Inflow Area = 0.140 ac, 0.00% Impervious, Inflow Depth = 0.90" for 1 year event
 Inflow = 0.26 cfs @ 11.92 hrs, Volume= 0.010 af
Outflow = 0.00 cfs @ 10.90 hrs, Volume= 0.010 af, Atten= 99%, Lag= 0.0 min
Primary = 0.00 cfs @ 10.90 hrs, Volume= 0.010 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 328.85' @ 24.01 hrs Surf.Area= 709 sf Storage= 351 cf

Plug-Flow detention time= 1,570.3 min calculated for 0.010 af (100% of inflow)

Center-of-Mass det. time= 1,570.4 min (2,404.1 - 833.7)

Volume	Invert	Avail.Storage	Storage Description
#1	328.00'	978 cf	Surface Ponding (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
328.00	180	72.0	0	0	180
329.00	844	160.0	471	471	1,809
329.50	1,195	183.0	507	978	2,442

Device	Routing	Invert	Outlet Devices
#1	Device 4	328.00'	0.500 in/hr Filtration over Surface area from 327.99' - 328.01' Excluded Surface area = 0 sf
#2	Device 4	328.90'	1.0" Vert. 1" Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 4	329.25'	6.0" Horiz. 6" Cast-iron dome inlet grate C= 0.600 Limited to weir flow at low heads

19054-Lot 30

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Type II 24-hr 1 year Rainfall=1.99"

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#4 Primary 324.75' **12.0" Round Pipe Outlet**
 L= 40.0' CPP, square edge headwall, Ke= 0.500
 Inlet / Outlet Invert= 324.75' / 324.50' S= 0.0063 '/' Cc= 0.900
 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 10.90 hrs HW=328.02' (Free Discharge)

- ↑ 4=Pipe Outlet (Passes 0.00 cfs of 6.02 cfs potential flow)
 - ↑ 1=Filtration (Exfiltration Controls 0.00 cfs)
 - 2=1" Orifice (Controls 0.00 cfs)
 - 3=6" Cast-iron dome inlet grate (Controls 0.00 cfs)

Summary for Pond YI: Lot 30 Drainage Improvements

Inflow Area = 1.870 ac, 0.00% Impervious, Inflow Depth = 0.53" for 1 year event
 Inflow = 1.07 cfs @ 12.02 hrs, Volume= 0.083 af
Outflow = 0.05 cfs @ 15.77 hrs, Volume= 0.083 af, Atten= 95%, Lag= 225.2 min
Primary = 0.05 cfs @ 15.77 hrs, Volume= 0.083 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 328.52' @ 15.77 hrs Surf.Area= 3,924 sf Storage= 1,893 cf

Plug-Flow detention time= 425.4 min calculated for 0.083 af (100% of inflow)
 Center-of-Mass det. time= 425.4 min (1,297.5 - 872.1)

Volume	Invert	Avail.Storage	Storage Description
#1	327.50'	4,233 cf	Lawn Area (Irregular) Listed below (Recalc)
#2	324.75'	106 cf	12.0" Round Pipe Storage L= 135.0' S= 0.0050 '/'
#3	324.75'	63 cf	4.00'D x 5.00'H Catchbasin
		4,402 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
327.50	12	24.0	0	0	12
328.00	1,695	288.0	308	308	6,567
329.00	6,707	422.0	3,925	4,233	14,146

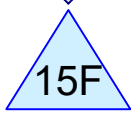
Device	Routing	Invert	Outlet Devices
#1	Primary	324.75'	12.0" Round Outlet Pipe L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.75' / 324.50' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	324.75'	1.0" Vert. 1" Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	328.55'	4.0' long Top Weir Wall 2 End Contraction(s)

Primary OutFlow Max=0.05 cfs @ 15.77 hrs HW=328.52' (Free Discharge)

- ↑ 1=Outlet Pipe (Passes 0.05 cfs of 6.60 cfs potential flow)
 - ↑ 2=1" Orifice (Orifice Controls 0.05 cfs @ 9.30 fps)
 - 3=Top Weir Wall (Controls 0.00 cfs)



DA-4



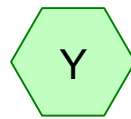
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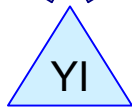
Bioretention Basin



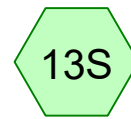
Lot 30



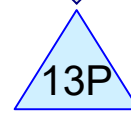
Backside of lots 19-29



Lot 30 Drainage Improvements



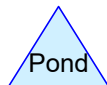
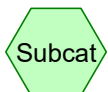
DA-3



(2) 10'x6' Filterra Units (FTIBC1006)



Pipe Storage



Routing Diagram for 19054-Lot 30

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19054-Lot 30**Type II 24-hr 10 year Rainfall=3.40"**

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Time span=0.00-120.00 hrs, dt=0.01 hrs, 12001 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 13S: DA-3 Runoff Area=0.460 ac 0.00% Impervious Runoff Depth=2.64"
 Flow Length=131' Slope=0.0450 '/' Tc=1.8 min CN=93 Runoff=2.31 cfs 0.101 af

Subcatchment 15S: DA-4 Runoff Area=0.140 ac 0.00% Impervious Runoff Depth=2.09"
 Flow Length=64' Slope=0.1500 '/' Tc=0.7 min CN=87 Runoff=0.61 cfs 0.024 af

Subcatchment AA: Lot 30 Runoff Area=1.160 ac 0.00% Impervious Runoff Depth=1.17"
 Flow Length=450' Slope=0.0060 '/' Tc=6.5 min CN=74 Runoff=2.37 cfs 0.113 af

Subcatchment Y: Backside of lots 19-29 Runoff Area=0.710 ac 0.00% Impervious Runoff Depth=2.01"
 Tc=19.4 min CN=86 Runoff=1.61 cfs 0.119 af

Pond 13P: (2) 10'x6' Filterra Units (FTIBC1006) Peak Elev=329.19' Storage=118 cf Inflow=2.31 cfs 0.101 af
 Outflow=2.30 cfs 0.101 af

Pond 14P: Pipe Storage Peak Elev=328.83' Storage=0.064 af Inflow=2.30 cfs 0.101 af
 Outflow=0.05 cfs 0.101 af

Pond 15F: Forebay #2 Peak Elev=328.59' Storage=327 cf Inflow=0.61 cfs 0.024 af
 Outflow=0.60 cfs 0.024 af

Pond 15P: Bioretention Basin Peak Elev=329.20' Storage=651 cf Inflow=0.60 cfs 0.024 af
 Outflow=0.02 cfs 0.024 af

Pond YI: Lot 30 Drainage Improvements Peak Elev=328.79' Storage=3,144 cf Inflow=3.46 cfs 0.232 af
 Outflow=1.61 cfs 0.232 af

Total Runoff Area = 2.470 ac Runoff Volume = 0.358 af Average Runoff Depth = 1.74"
100.00% Pervious = 2.470 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 13S: DA-3

Runoff = 2.31 cfs @ 11.92 hrs, Volume= 0.101 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 year Rainfall=3.40"

Area (ac)	CN	Description
* 0.460	93	Modified CN
0.460	93	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	131	0.0450	1.20		Lag/CN Method, LAG

Summary for Subcatchment 15S: DA-4

[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.61 cfs @ 11.91 hrs, Volume= 0.024 af, Depth= 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 year Rainfall=3.40"

Area (ac)	CN	Description
* 0.140	87	Modified CN
0.140	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	64	0.1500	1.49		Lag/CN Method, LAG

Summary for Subcatchment AA: Lot 30

Runoff = 2.37 cfs @ 11.98 hrs, Volume= 0.113 af, Depth= 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 year Rainfall=3.40"

Area (ac)	CN	Description
1.160	74	>75% Grass cover, Good, HSG C
1.160	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	450	0.0060	1.16		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps

Summary for Subcatchment Y: Backside of lots 19-29

Runoff = 1.61 cfs @ 12.12 hrs, Volume= 0.119 af, Depth= 2.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 10 year Rainfall=3.40"

Area (ac)	CN	Description
* 0.710	86	
0.710	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.4					Direct Entry,

Summary for Pond 13P: (2) 10'x6' Filterra Units (FTIBC1006)

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 2.64" for 10 year event
 Inflow = 2.31 cfs @ 11.92 hrs, Volume= 0.101 af
Outflow = 2.30 cfs @ 11.92 hrs, Volume= 0.101 af, Atten= 1%, Lag= 0.1 min
Primary = 2.30 cfs @ 11.92 hrs, Volume= 0.101 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 329.19' @ 11.92 hrs Surf.Area= 120 sf Storage= 118 cf

Plug-Flow detention time= 1.1 min calculated for 0.101 af (100% of inflow)
 Center-of-Mass det. time= 0.7 min (784.2 - 783.5)

Volume	Invert	Avail.Storage	Storage Description
#1	328.21'	132 cf	6.00'W x 10.00'L x 1.10'H Vault x 2

Device	Routing	Invert	Outlet Devices
#1	Device 3	328.21'	140.000 in/hr Filtration over Surface area from 328.20' - 328.22' Excluded Surface area = 0 sf
#2	Device 3	328.96'	10.0" Horiz. 10" Overflow Pipe X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	325.71'	10.0" Round 10" PVC Pipe L= 54.0' Ke= 0.200 Inlet / Outlet Invert= 325.71' / 324.98' S= 0.0135 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=2.29 cfs @ 11.92 hrs HW=329.19' (Free Discharge)

↑ **3=10" PVC Pipe** (Passes 2.29 cfs of 5.11 cfs potential flow)

↑ **1=10" Filtration** (Exfiltration Controls 0.39 cfs)

↑ **2=10" Overflow Pipe** (Weir Controls 1.90 cfs @ 1.57 fps)

Summary for Pond 14P: Pipe Storage

[81] Warning: Exceeded Pond 13P by 0.62' @ 14.62 hrs

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 2.64" for 10 year event
 Inflow = 2.30 cfs @ 11.92 hrs, Volume= 0.101 af
Outflow = 0.05 cfs @ 14.62 hrs, Volume= 0.101 af, Atten= 98%, Lag= 161.6 min
Primary = 0.05 cfs @ 14.62 hrs, Volume= 0.101 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Peak Elev= 328.83' @ 14.62 hrs Surf.Area= 0.013 ac Storage= 0.064 af

Plug-Flow detention time= 667.1 min calculated for 0.101 af (100% of inflow)
 Center-of-Mass det. time= 667.1 min (1,451.3 - 784.2)

Volume	Invert	Avail.Storage	Storage Description
#1	325.25'	0.066 af	48.0" Round 48" Pipe L= 230.0'
#2	325.25'	0.001 af	4.00'D x 4.50'H Drainage Manhole
		0.068 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Device 3	325.25'	1.0" Vert. 1" Orifice C= 0.600 Limited to weir flow at low heads
#2	Device 3	328.95'	5.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#3	Primary	325.25'	15.0" Round 15" Outlet Pipe L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 325.25' / 324.98' S= 0.0054 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.05 cfs @ 14.62 hrs HW=328.83' (Free Discharge)
 ↖ **3=15" Outlet Pipe** (Passes 0.05 cfs of 9.73 cfs potential flow)
 ↖ **1=1" Orifice** (Orifice Controls 0.05 cfs @ 9.06 fps)
 ↖ **2=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 15F: Forebay #2

Inflow Area = 0.140 ac, 0.00% Impervious, Inflow Depth = 2.09" for 10 year event
 Inflow = 0.61 cfs @ 11.91 hrs, Volume= 0.024 af
Outflow = 0.60 cfs @ 11.92 hrs, Volume= 0.024 af, Atten= 2%, Lag= 0.4 min
Primary = 0.60 cfs @ 11.92 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Starting Elev= 328.50' Surf.Area= 278 sf Storage= 302 cf
Peak Elev= 328.59' @ 11.92 hrs Surf.Area= 297 sf Storage= 327 cf (25 cf above start)

Plug-Flow detention time= 151.3 min calculated for 0.017 af (72% of inflow)
 Center-of-Mass det. time= 1.1 min (809.4 - 808.3)

19054-Lot 30

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Type II 24-hr 10 year Rainfall=3.40"

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Volume	Invert	Avail.Storage	Storage Description
#1	326.50'	470 cf	Forebay Storage (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
326.50	43	46.0	0	0	43
327.00	93	53.0	33	33	103
328.00	210	65.0	148	181	231
328.50	278	71.0	122	302	304
329.00	395	87.0	167	470	509

Device	Routing	Invert	Outlet Devices
#1	Primary	328.50'	10.0' long x 5.0' breadth Stone Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.59 cfs @ 11.92 hrs HW=328.59' (Free Discharge)

↑**1=Stone Spillway** (Weir Controls 0.59 cfs @ 0.69 fps)

Summary for Pond 15P: Bioretention Basin

[81] Warning: Exceeded Pond 15F by 0.69' @ 14.06 hrs

Inflow Area = 0.140 ac, 0.00% Impervious, Inflow Depth = 2.09" for 10 year event
 Inflow = 0.60 cfs @ 11.92 hrs, Volume= 0.024 af
Outflow = 0.02 cfs @ 14.01 hrs, Volume= 0.024 af, Atten= 97%, Lag= 125.8 min
Primary = 0.02 cfs @ 14.01 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 329.20' @ 14.01 hrs Surf.Area= 976 sf Storage= 651 cf

Plug-Flow detention time= 1,091.6 min calculated for 0.024 af (100% of inflow)

Center-of-Mass det. time= 1,091.6 min (1,901.0 - 809.4)

Volume	Invert	Avail.Storage	Storage Description
#1	328.00'	978 cf	Surface Ponding (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
328.00	180	72.0	0	0	180
329.00	844	160.0	471	471	1,809
329.50	1,195	183.0	507	978	2,442

Device	Routing	Invert	Outlet Devices
#1	Device 4	328.00'	0.500 in/hr Filtration over Surface area from 327.99' - 328.01' Excluded Surface area = 0 sf
#2	Device 4	328.90'	1.0" Vert. 1" Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 4	329.25'	6.0" Horiz. 6" Cast-iron dome inlet grate C= 0.600 Limited to weir flow at low heads

19054-Lot 30

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Type II 24-hr 10 year Rainfall=3.40"

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#4 Primary 324.75' **12.0" Round Pipe Outlet**
 L= 40.0' CPP, square edge headwall, Ke= 0.500
 Inlet / Outlet Invert= 324.75' / 324.50' S= 0.0063 '/' Cc= 0.900
 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.02 cfs @ 14.01 hrs HW=329.20' (Free Discharge)

- ↳ **4=Pipe Outlet** (Passes 0.02 cfs of 7.30 cfs potential flow)
 - ↳ **1=Filtration** (Exfiltration Controls 0.00 cfs)
 - ↳ **2=1" Orifice** (Orifice Controls 0.01 cfs @ 2.44 fps)
 - ↳ **3=6" Cast-iron dome inlet grate** (Controls 0.00 cfs)

Summary for Pond YI: Lot 30 Drainage Improvements

Inflow Area = 1.870 ac, 0.00% Impervious, Inflow Depth = 1.49" for 10 year event
 Inflow = 3.46 cfs @ 12.00 hrs, Volume= 0.232 af
Outflow = 1.61 cfs @ 12.23 hrs, Volume= 0.232 af, Atten= 53%, Lag= 14.0 min
Primary = 1.61 cfs @ 12.23 hrs, Volume= 0.232 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 328.79' @ 12.23 hrs Surf.Area= 5,415 sf Storage= 3,144 cf

Plug-Flow detention time= 223.0 min calculated for 0.232 af (100% of inflow)
 Center-of-Mass det. time= 223.1 min (1,065.1 - 842.0)

Volume	Invert	Avail.Storage	Storage Description
#1	327.50'	4,233 cf	Lawn Area (Irregular) Listed below (Recalc)
#2	324.75'	106 cf	12.0" Round Pipe Storage L= 135.0' S= 0.0050 '/'
#3	324.75'	63 cf	4.00'D x 5.00'H Catchbasin
		4,402 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
327.50	12	24.0	0	0	12
328.00	1,695	288.0	308	308	6,567
329.00	6,707	422.0	3,925	4,233	14,146

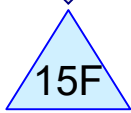
Device	Routing	Invert	Outlet Devices
#1	Primary	324.75'	12.0" Round Outlet Pipe L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.75' / 324.50' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	324.75'	1.0" Vert. 1" Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	328.55'	4.0' long Top Weir Wall 2 End Contraction(s)

Primary OutFlow Max=1.61 cfs @ 12.23 hrs HW=328.79' (Free Discharge)

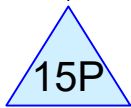
- ↳ **1=Outlet Pipe** (Passes 1.61 cfs of 6.89 cfs potential flow)
 - ↳ **2=1" Orifice** (Orifice Controls 0.05 cfs @ 9.63 fps)
 - ↳ **3=Top Weir Wall** (Weir Controls 1.55 cfs @ 1.61 fps)



DA-4



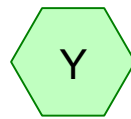
Forebay #2



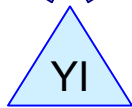
Bioretention Basin



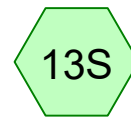
Lot 30



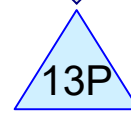
Backside of lots 19-29



Lot 30 Drainage Improvements



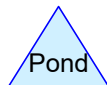
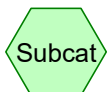
DA-3



(2) 10'x6' Filterra Units (FTIBC1006)



Pipe Storage



Routing Diagram for 19054-Lot 30

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19054-Lot 30**Type II 24-hr 100 year Rainfall=5.08"**

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Time span=0.00-120.00 hrs, dt=0.01 hrs, 12001 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 13S: DA-3 Runoff Area=0.460 ac 0.00% Impervious Runoff Depth=4.28"
 Flow Length=131' Slope=0.0450 '/' Tc=1.8 min CN=93 Runoff=3.62 cfs 0.164 af

Subcatchment 15S: DA-4 Runoff Area=0.140 ac 0.00% Impervious Runoff Depth=3.64"
 Flow Length=64' Slope=0.1500 '/' Tc=0.7 min CN=87 Runoff=1.03 cfs 0.042 af

Subcatchment AA: Lot 30 Runoff Area=1.160 ac 0.00% Impervious Runoff Depth=2.43"
 Flow Length=450' Slope=0.0060 '/' Tc=6.5 min CN=74 Runoff=4.95 cfs 0.235 af

Subcatchment Y: Backside of lots 19-29 Runoff Area=0.710 ac 0.00% Impervious Runoff Depth=3.54"
 Tc=19.4 min CN=86 Runoff=2.81 cfs 0.210 af

Pond 13P: (2) 10'x6' Filterra Units (FTIBC1006) Peak Elev=329.36' Storage=132 cf Inflow=3.62 cfs 0.164 af
 Outflow=3.71 cfs 0.164 af

Pond 14P: Pipe Storage Peak Elev=329.34' Storage=0.068 af Inflow=3.71 cfs 0.164 af
 Outflow=3.92 cfs 0.164 af

Pond 15F: Forebay #2 Peak Elev=328.62' Storage=338 cf Inflow=1.03 cfs 0.042 af
 Outflow=1.01 cfs 0.042 af

Pond 15P: Bioretention Basin Peak Elev=329.42' Storage=886 cf Inflow=1.01 cfs 0.042 af
 Outflow=0.38 cfs 0.042 af

Pond YI: Lot 30 Drainage Improvements Peak Elev=329.17' Storage=4,394 cf Inflow=6.85 cfs 0.444 af
 Outflow=6.22 cfs 0.443 af

Total Runoff Area = 2.470 ac Runoff Volume = 0.651 af Average Runoff Depth = 3.16"
100.00% Pervious = 2.470 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 13S: DA-3

Runoff = 3.62 cfs @ 11.92 hrs, Volume= 0.164 af, Depth= 4.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.460	93	Modified CN
0.460	93	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	131	0.0450	1.20		Lag/CN Method, LAG

Summary for Subcatchment 15S: DA-4

[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.03 cfs @ 11.91 hrs, Volume= 0.042 af, Depth= 3.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.140	87	Modified CN
0.140	87	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	64	0.1500	1.49		Lag/CN Method, LAG

Summary for Subcatchment AA: Lot 30

Runoff = 4.95 cfs @ 11.98 hrs, Volume= 0.235 af, Depth= 2.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
1.160	74	>75% Grass cover, Good, HSG C
1.160	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	450	0.0060	1.16		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps

Summary for Subcatchment Y: Backside of lots 19-29

Runoff = 2.81 cfs @ 12.11 hrs, Volume= 0.210 af, Depth= 3.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Type II 24-hr 100 year Rainfall=5.08"

Area (ac)	CN	Description
* 0.710	86	
0.710	86	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.4					Direct Entry,

Summary for Pond 13P: (2) 10'x6' Filterra Units (FTIBC1006)

[93] Warning: Storage range exceeded by 0.05'

[88] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 4.28" for 100 year event
 Inflow = 3.62 cfs @ 11.92 hrs, Volume= 0.164 af
 Outflow = 3.71 cfs @ 11.92 hrs, Volume= 0.164 af, Atten= 0%, Lag= 0.1 min
 Primary = 3.71 cfs @ 11.92 hrs, Volume= 0.164 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 329.36' @ 11.92 hrs Surf.Area= 120 sf Storage= 132 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 0.6 min (771.1 - 770.5)

Volume	Invert	Avail.Storage	Storage Description
#1	328.21'	132 cf	6.00'W x 10.00'L x 1.10'H Vault x 2

Device	Routing	Invert	Outlet Devices
#1	Device 3	328.21'	140.000 in/hr Filtration over Surface area from 328.20' - 328.22' Excluded Surface area = 0 sf
#2	Device 3	328.96'	10.0" Horiz. 10" Overflow Pipe X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Primary	325.71'	10.0" Round 10" PVC Pipe L= 54.0' Ke= 0.200 Inlet / Outlet Invert= 325.71' / 324.98' S= 0.0135 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=3.68 cfs @ 11.92 hrs HW=329.35' (Free Discharge)

3=10" PVC Pipe (Passes 3.68 cfs of 5.23 cfs potential flow)

1=10" Filtration (Exfiltration Controls 0.39 cfs)

2=10" Overflow Pipe (Orifice Controls 3.29 cfs @ 3.01 fps)

Summary for Pond 14P: Pipe Storage

[88] Warning: Qout>Qin may require smaller dt or Finer Routing

[81] Warning: Exceeded Pond 13P by 0.80' @ 12.47 hrs

Inflow Area = 0.460 ac, 0.00% Impervious, Inflow Depth = 4.28" for 100 year event
 Inflow = 3.71 cfs @ 11.92 hrs, Volume= 0.164 af
Outflow = 3.92 cfs @ 11.94 hrs, Volume= 0.164 af, Atten= 0%, Lag= 1.0 min
Primary = 3.92 cfs @ 11.94 hrs, Volume= 0.164 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Peak Elev= 329.34' @ 11.94 hrs Surf.Area= 0.000 ac Storage= 0.068 af

Plug-Flow detention time= 488.0 min calculated for 0.164 af (100% of inflow)
 Center-of-Mass det. time= 488.1 min (1,259.2 - 771.1)

Volume	Invert	Avail.Storage	Storage Description
#1	325.25'	0.066 af	48.0" Round 48" Pipe L= 230.0'
#2	325.25'	0.001 af	4.00'D x 4.50'H Drainage Manhole
		0.068 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Device 3	325.25'	1.0" Vert. 1" Orifice C= 0.600 Limited to weir flow at low heads
#2	Device 3	328.95'	5.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#3	Primary	325.25'	15.0" Round 15" Outlet Pipe L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 325.25' / 324.98' S= 0.0054 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=3.83 cfs @ 11.94 hrs HW=329.33' (Free Discharge)

↑ **3=15" Outlet Pipe** (Passes 3.83 cfs of 10.62 cfs potential flow)

↑ **1=1" Orifice** (Orifice Controls 0.05 cfs @ 9.68 fps)

↑ **2=Sharp-Crested Rectangular Weir**(Weir Controls 3.78 cfs @ 2.02 fps)

Summary for Pond 15F: Forebay #2

Inflow Area = 0.140 ac, 0.00% Impervious, Inflow Depth = 3.64" for 100 year event
 Inflow = 1.03 cfs @ 11.91 hrs, Volume= 0.042 af
Outflow = 1.01 cfs @ 11.91 hrs, Volume= 0.042 af, Atten= 2%, Lag= 0.3 min
Primary = 1.01 cfs @ 11.91 hrs, Volume= 0.042 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs

Starting Elev= 328.50' Surf.Area= 278 sf Storage= 302 cf

Peak Elev= 328.62' @ 11.91 hrs Surf.Area= 305 sf Storage= 338 cf (36 cf above start)

Plug-Flow detention time= 106.9 min calculated for 0.036 af (84% of inflow)
 Center-of-Mass det. time= 1.0 min (793.6 - 792.6)

19054-Lot 30

Type II 24-hr 100 year Rainfall=5.08"

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Volume	Invert	Avail.Storage	Storage Description
#1	326.50'	470 cf	Forebay Storage (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
326.50	43	46.0	0	0	43
327.00	93	53.0	33	33	103
328.00	210	65.0	148	181	231
328.50	278	71.0	122	302	304
329.00	395	87.0	167	470	509

Device	Routing	Invert	Outlet Devices
#1	Primary	328.50'	10.0' long x 5.0' breadth Stone Spillway Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.01 cfs @ 11.91 hrs HW=328.62' (Free Discharge)

↑**1=Stone Spillway** (Weir Controls 1.01 cfs @ 0.82 fps)

Summary for Pond 15P: Bioretention Basin

[81] Warning: Exceeded Pond 15F by 0.87' @ 12.02 hrs

Inflow Area = 0.140 ac, 0.00% Impervious, Inflow Depth = 3.64" for 100 year event
 Inflow = 1.01 cfs @ 11.91 hrs, Volume= 0.042 af
Outflow = 0.38 cfs @ 11.99 hrs, Volume= 0.042 af, Atten= 62%, Lag= 4.8 min
Primary = 0.38 cfs @ 11.99 hrs, Volume= 0.042 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Peak Elev= 329.42' @ 11.99 hrs Surf.Area= 1,135 sf Storage= 886 cf

Plug-Flow detention time= 712.6 min calculated for 0.042 af (100% of inflow)
 Center-of-Mass det. time= 712.9 min (1,506.5 - 793.6)

Volume	Invert	Avail.Storage	Storage Description
#1	328.00'	978 cf	Surface Ponding (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
328.00	180	72.0	0	0	180
329.00	844	160.0	471	471	1,809
329.50	1,195	183.0	507	978	2,442

Device	Routing	Invert	Outlet Devices
#1	Device 4	328.00'	0.500 in/hr Filtration over Surface area from 327.99' - 328.01' Excluded Surface area = 0 sf
#2	Device 4	328.90'	1.0" Vert. 1" Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 4	329.25'	6.0" Horiz. 6" Cast-iron dome inlet grate C= 0.600 Limited to weir flow at low heads

19054-Lot 30

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Type II 24-hr 100 year Rainfall=5.08"

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#4 Primary 324.75' **12.0" Round Pipe Outlet**
 L= 40.0' CPP, square edge headwall, Ke= 0.500
 Inlet / Outlet Invert= 324.75' / 324.50' S= 0.0063 '/' Cc= 0.900
 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.38 cfs @ 11.99 hrs HW=329.42' (Free Discharge)

↑ **4=Pipe Outlet** (Passes 0.38 cfs of 7.52 cfs potential flow)

↑ **1=Filtration** (Exfiltration Controls 0.00 cfs)

↑ **2=1" Orifice** (Orifice Controls 0.02 cfs @ 3.33 fps)

↑ **3=6" Cast-iron dome inlet grate** (Weir Controls 0.36 cfs @ 1.35 fps)

Summary for Pond YI: Lot 30 Drainage Improvements

Inflow Area = 1.870 ac, 0.00% Impervious, Inflow Depth = 2.85" for 100 year event
 Inflow = 6.85 cfs @ 11.99 hrs, Volume= 0.444 af
Outflow = 6.22 cfs @ 12.03 hrs, Volume= 0.443 af, Atten= 9%, Lag= 2.5 min
Primary = 6.22 cfs @ 12.03 hrs, Volume= 0.443 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 329.17' @ 12.03 hrs Surf.Area= 6,720 sf Storage= 4,394 cf

Plug-Flow detention time= 129.8 min calculated for 0.443 af (100% of inflow)

Center-of-Mass det. time= 127.8 min (952.0 - 824.1)

Volume	Invert	Avail.Storage	Storage Description
#1	327.50'	4,233 cf	Lawn Area (Irregular) Listed below (Recalc)
#2	324.75'	106 cf	12.0" Round Pipe Storage L= 135.0' S= 0.0050 '/'
#3	324.75'	63 cf	4.00'D x 5.00'H Catchbasin
		4,402 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
327.50	12	24.0	0	0	12
328.00	1,695	288.0	308	308	6,567
329.00	6,707	422.0	3,925	4,233	14,146

Device	Routing	Invert	Outlet Devices
#1	Primary	324.75'	12.0" Round Outlet Pipe L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 324.75' / 324.50' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	324.75'	1.0" Vert. 1" Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	328.55'	4.0' long Top Weir Wall 2 End Contraction(s)

Primary OutFlow Max=5.93 cfs @ 12.03 hrs HW=329.15' (Free Discharge)

↑ **1=Outlet Pipe** (Passes 5.93 cfs of 7.25 cfs potential flow)

↑ **2=1" Orifice** (Orifice Controls 0.05 cfs @ 10.05 fps)

↑ **3=Top Weir Wall** (Weir Controls 5.88 cfs @ 2.53 fps)